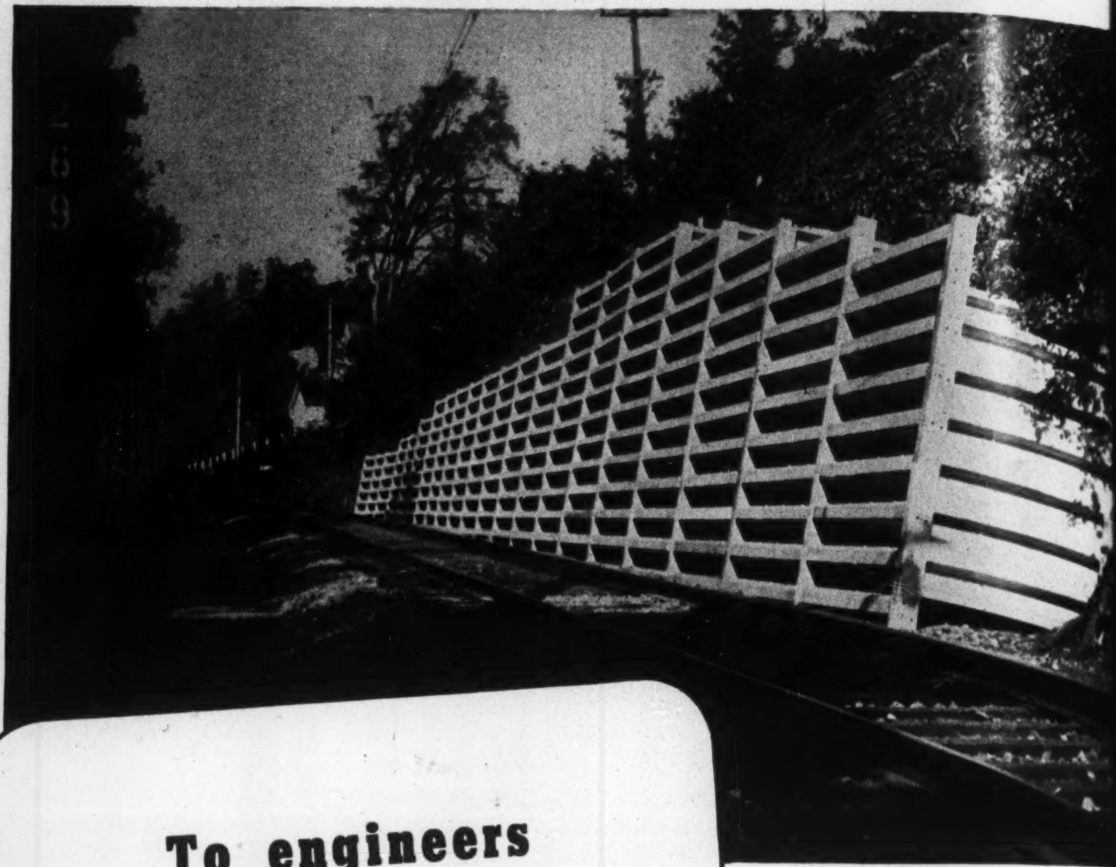
On the double-quick, Seabees surface a Pacific airstrip with steel mats—see article inside.

Featured
This Issue



To engineers who are planning the "BATTLE OF PEACE"

Space was at a premium for widening a hig way above this railroad cut. The answer wa an ARMCO Bin-Type Retaining Wall to pr vent encroachment of the slope upon the trac

★ ★ ★

America will need your plans. Millions of fighting men and other millions of war workers must some day turn to new jobs in a new and different world. You can help by planning now to avert a serious let-down when Victory is won.

No doubt you are thinking about many projects that would not only improve roads and streets, but even more important would provide jobs for returning service men and workers now in war industries. Even now industry is planning post-war developments to absorb its share of these people. If federal, state and municipal governments have their plans ready, unemployment will be less of a problem to Americ

In this "board work" you ma need a practical solution for u stable slopes, rights-of-way an similar problems. Remembe ARMCO Bin-Type Walls for thei ability to overcome unequal settle ment without cracking or bulging

So include ARMCO Walls in you plans for the future even thoug you can't get them for immediat construction. Right now tanks, gun and ships are most importan Armco Drainage Products Associa tion, 365 Curtis St., Middletown, O

ARMCO ARMCO **Bin-Type RETAINING WALL**

NGINEERING NEWS-RECORD

ed to Buildings, Sewers, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Shipbuilding, Irrigation, Canals, Railroads
McGRAW-HILL PUBLISHING COMPANY, INC.
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JOHN ABBINK, *Publisher*
WALDO G. BOWMAN, *Editor* **ALBERT E. PAXTON**, *Manager*

. 133 AUGUST 24, 1944 No. 8

OMING NEXT

genuity in solving wartime water ply problems finds expression in articles dealing with major ex- sion of existing facilities. At ington, N. C., a 21-mile supply was installed and a 7 mgd. ment plant constructed to elimi- a salt-contaminated source and vide adequate water for a war- llen population.

r away from the eastern sea- d—at Tulsa, Okla.—the impact war also was experienced by cipal waterworks engineers. eful planning and quick action e possible the enlargement of system by 67 percent in time to with industrial and summer k demands.

ack from the frozen wastes of enland, American contractors Army engineers are now per- ted to tell of their activities in ilding airfield bases and weather ions. Shortly after these men ived in the States after 27 months heroic accomplishments, an *ENR* tor interviewed the keymen. He ords this interview in, "The Saga the Greenland Bases".

Package mail for the Army over- s has become so great that a cial post office for this service has n built in New York City. What 12-acre building looks like and it was built in a rush schedule 4½ months is the subject of "c/o tmaster New York".

or better field control of concrete, mograph chart has been devised xpedite the analysis of samples n a mixed batch.

HINGS TO COME

hile our airmen are bombing n from bases in China we have overlooked the possibility of king from still another direction e northern islands of the Aleu- s. Here we have built "steel- d steps to Tokyo", the construc- n of which will be described by R editor, H. W. Richardson.

rmy engineers are equally adept fighting Germans, Japs and river s. In the latter category they ed their prowess in checkmat- the Mississippi River near Good- , La., by means of articulated crete mattresses. The 3,000 ft. tment was placed in 20 days de- high water and swift currents.

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DO YOU WANT AN INDEX?

Due to the paper shortage, no index for the volume just completed, No. 132 (January-June, 1944) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below. The index will be ready for distribution in the latter part of August.

Editor—Engineering News-Record
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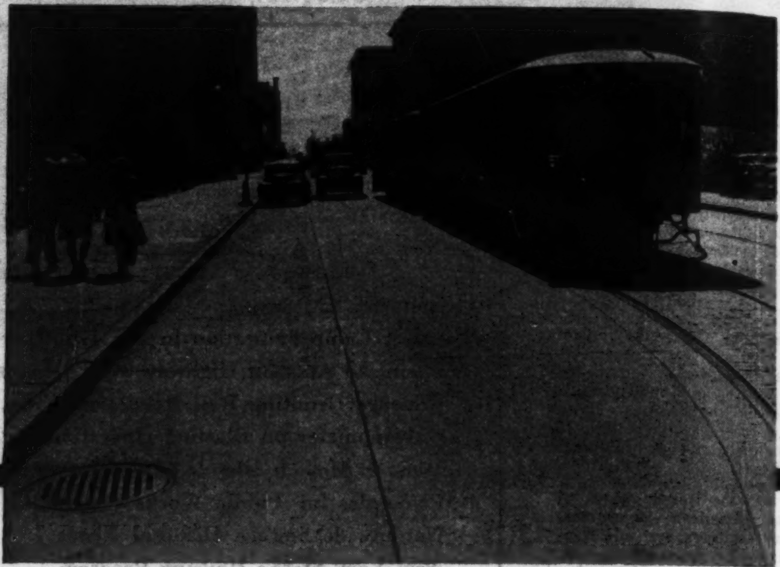

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Minneapolis car-track paving made with Atlas Duraplastic* air-entraining portland cement practically scale-free after 5 winters of repeated heavy applications of de-icing salts.

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ATLAS DURAPLASTIC CEMENT

A Universal Atlas Product

onstruction planning too low for new war tempo

onditions are favorable, however, for increased construction volume if plans are made ready for contract ubject to available materials

ith the war moving at new high
d and creating conditions under
h Germany can collapse suddenly.
effect of such a collapse on con-
ction becomes an important con-
ration.

irst industry to go to war, construc-
has completed the bulk of its war
k with distinction, and it should be
position to lead the way back. Yet
y doubts that it is ready are being
ressed, principally to the effect that
enough plans are scheduled for bids,
plete with land acquired, financing
vided and all legal and political ob-
cles removed. Continued shortages of
e materials and equipment, and the
rt of War Production Board controls
e other doubts as to whether con-
uction work can go ahead and when
an start.

o far in 1944, engineering construc-
has averaged around $35,000,000 a
k, a rate that would produce a
r's total of $1,820,000,000. This
pares with the 1942 war construc-
peak of $8,000,000,000. It also
pares with the depression low of
068,000,000. The civil construction
klog of proposed postwar construc-
projects has topped $12,000,-
000, but out of this total plans un-
way add up to only $3,800,000,000.
statistics are available, so far, to
ure the plans ready for bids.

Apathetic planning

t is possible, as claimed in some
rters, that reports on many public
ks projects are being held up until
known what federal-aid funds will
vailable to local communities, and
the almost complete reticence on
part of industry and private inter-
to declare their intentions as to what
truction they will start or when they
ld like to start it, holds the post-
planning figures down. Yet it is not likely that the picture would be much improved even if reports on all plans were available.

This seeming apathy toward construction planning is not justified by conditions, which are rapidly changing to a point where a higher rate of construction is not only possible but desirable. Already projects planned for the postwar period have been taken out of the postwar backlog totals, because they have been advanced to current contracts; a $1,500,000 industrial plant in Colorado is one, a $5,000,000 sewerage and waterworks development in Baltimore is another.

In July the War Production Board added a fourth class of construction to the three that could go ahead where conditions justified. These four classes of permitted construction work are those which are: (1) Essential to the war effort; (2) directly supporting the war effort; (3) essential to civilian health and safety; and (4) needed to maintain a healthy civilian economy.

For the transition period, when controls are being relaxed, WPB has established the so-called spot authorization procedure, Priorities Regulation No. 25, providing a method for authorizing civil production through field offices of

FULL DEPTH
INTERNAL
SLAB
VIBRATOR

New vibrator tested on California airport job

A new type vibrator that is credited with speeding concrete laying materially is getting its first large-scale field test on construction of a 8,500-ft. long airstrip for Consolidated-Vultee Aircraft Corp. at Lindbergh Field, San Diego, Calif. The strip is 200 ft. wide and 12 in. thick, being designed for a 85,000-lb. wheel load. It is being laid in 25-ft. sections. Concrete of the warmup aprons is 14 in. thick. Construction of the strip and aprons calls for the pouring of about 103,000 cu.yd. of concrete.

Contractors for the $2,500,000 job, the longest of any commercial field runway built to date, are Casson & Ball of Hayward and Berkeley, Calif. They are employing more than $2,000,000 worth of equipment in order to complete the work in 150 calendar days.

the WPB, when labor, facilities and materials are available. Through this procedure it will be possible to give the "go" sign to the most essential civil needs first.

The removal of Germany from the war will clear the decks for an overall 30 to 40 percent cutback in war contracts—from 10 percent on some products to 100 percent on others. This will release both labor and materials for civil work.

Materials and labor

The materials that continue tight, and whose unavailability would delay some classes of structures in a reviving construction program are: Lumber in the small sizes, or boards and plywood now going into shipping containers; electrical appliances using either small or large motors; and plumbing and heating equipment. Steel ingots are now plentiful, but sheets and plates are needed for essential war use up to the full rolling capacity. Valves are again available since high octane gasoline and synthetic rubber plant needs have been met and shipbuilding has leveled off.

Restrictions or the ceiling in allowable unit cost of new houses or mass housing will probably be retained until refrigerators, stoves, plumbing and heating equipment are available for houses designed for higher price ranges. Items which will be given a preference rating of AA-5 under the new Priorities Regulation 25 to authorize manufacture of civilian products under certain specific conditions so as not to interfere with the war effort, include domestic mechanical refrigerators on all items except electric, domestic laundry equipment on all items except washing machines; domestic ranges on all items, domestic cooking appliances and domestic heating stoves on all items.

Labor stringency is expected by Washington authorities to continue for ninety days after Germany's defeat while mopping up operations in Europe are organized and supplied, and while production cutbacks are put through at home and "spot" authorizations made to go ahead on civil production. These authorities look also for an increase in the number of men demobilized from the present rate of 100,000 per month to a rate of 250,000 per month.

No equipment shortages

Construction equipment owned by contractors or available to them is adequate to carry out a larger construction volume than now appears to be in the planning stage. War needs have so increased the capacity of the construction machinery manufacturers that no shortages have appeared which would limit work for which plans are in sight. Restrictions have been removed or eased on 36 types of construction equipment since July 24, although Gen. Brehon B. Somervell, commanding general, Army Service Forces, reports continued shortages of heavy trucks, tires, tractors, artillery cranes, derricks, bulldozers and power shovels, and these must be made up before any peacetime production can be begun.

The classes of construction that appear to be in the best position to go ahead as needed are shown in the accompanying table.

POSTWAR CONSTRUCTION PROJECT VOLUME—JAN. 1, 1943 THROUGH AUG. 17, 1944 (As Reported to Engineering News-Record)

	Proposed projects	Plans underway or completed	% Plans underway
Waterworks	$ 454,447,000	$ 256,103,000	56
Sewerage	755,649,000	434,838,000	57
Bridges, Public	579,845,000	354,474,000	61
Bridges, Private	150,000	100,000	67
Earthwork, Irrigation and Drainage	4,876,421,000	615,163,000	13
Streets and Roads	1,851,019,000	851,752,000	46
Unclassified, Public	1,274,032,000	426,411,000	33
Unclassified, Private	263,405,000	26,675,000	10
Buildings, Public	1,656,429,000	586,511,000	35
Buildings, Commercial	389,664,000	202,838,000	52
Buildings, Industrial	100,511,000	24,756,000	25
Total	$12,201,572,000	$3,779,116,000	31

Sewage Works Federation convention in October

Plans are nearing completion for the fifth annual meeting of the Federation of Sewage Works Associations, to be held in Pittsburgh on Oct. 12-14, and details of the technical sessions have been announced by F. W. Gilcreas, chairman of the program committee.

Industrial waste treatment methods will receive major attention in a symposium of six papers, providing new information on the treatment of wastes from synthetic rubber plants, canning and chemical industries. Operation of sewerage systems, with special attention to infiltration and storm flow control, as well as the ventilation of sewers, will be outlined in another symposium.

A "preconvention get-together" is scheduled for Wednesday evening, Oct. 11, at the Hotel William Penn, which will serve as headquarters for both the technical sessions and the exhibits.

J. A. LePrince honored b
Memphis Engineers' Clu

Joseph A. LePrince, veteran sanitar
engineer who established the fund
mental engineering concepts for mo
quito control that led to curbing
yellow fever and malaria during th
construction of the Panama Canal, wa
honored by the Engineers' Club
Memphis, which presented him with
plaque on his 69th birthday.

Mr. LePrince, who was retired fro
the U. S. Public Health Service in 193
after twenty-two years with that organi
zation, maintained headquarters
Memphis from which he directed mal
ria control measures through the Sout
His advice on the engineering phas
of mosquito control has been sought
nations throughout the world, and
served as one of the chief sanitary co
sultants prior to and during th
construction of the Tennessee Valle
Authority reservoirs.

A civil engineer graduate of Colum
bia University in 1898, Mr. LePrinc
first attracted attention by his work
yellow fever control with General Go
gas in Cuba. In 1904 he was sent
Panama as chief sanitary officer, an
he remained at the Canal Zone po
until 1917. Among his many contrib
tions to malaria control was an accura
determination of the flight range
mosquitos using insects sprayed wi
various colored dyes, and these finding
led to the present policy of establishin
a one-mile "control" zone around mil
tary establishments. Other investig
tions of Mr. LePrince produced ne
types of ditch linings, insecticides, an
power dusting methods from boats an
planes.

• • •

Chile plans postwar public works program

A public works program calling f
an investment of $340,000,000 was r
vealed at a recent cabinet meeting b
Dr. Abram Alcaino, Chilean minister
public works and communications.

Preliminary surveys on many of th
projects contemplated under the po
war building program have been co
pleted, and include railroads, highway
bridges, water and irrigation system
harbor improvements, governme
buildings, and numerous other pr
jects. The program would be
nanced by bond issues available to f
eign and domestic purchasers.

To raise health and living standar
in congested urban areas, it is plann
to set aside approximately $25,000,0
for low-cost housing projects, a
another $5,000,000 for recreational f
cilities.

llegheny County prepared to start ig postwar program on short notice

lans completed for 15 projects totalling over $2,000,000 and sign work well advanced on 23 jobs costing over $10,000,000

llegheny County, Pa., in which sburgh is located, has detailed s and specifications ready so that 24 hours' notice a $52,320,000 post- program of highway, bridge and ort construction could be started. now planned, the county during the 10 years after the war will spend 00,000 annually, including $17,000,- on highways, nearly $14,000,000 bridges, over $10,000,000 on an port in Moon Township, and $11,- 000 for improvements to schools, pital and health facilities, public ldings and two parks.

The extensive job of planning this gram was done by more than 100 igners, architects, engineers and nners working as a special postwar reau under Planning Commissioner rk H. Martin and Works Director hn B. Sweeney. The county's staff been working on the plans for a r.

The present program comprises 98 ojects and will cost $52,320,000, in- uding $3,608,000 for land damages d $48,712,000 for construction. Of is total, 30 projects costing almost 6,000,000 are only in the "idea" ge and 30 more jobs expected to t $12,027,000 are in the "prelim- ary" stage.

Many designs complete

In the "design" stage status there are 3 projects costing about $10,092,000, d in the "completed" stage are 15 bs expected to cost $2,225,000. The tter jobs and their estimated costs e as follows:

McNight Road, part of a four-lane vided highway from Pittsburgh to bcock Blvd., including major inter- anges at Babcock Blvd. and Nelson un Road, a connection with East St., d a bridge, $1,134,000; 6,300-ft. ortcut in Moon Township from oute 51 to projected new airport rkway, $300,000; and Steuben St. ex- nsion from Crafton to Middletown oad—a new 36-ft. wide speedway 500 ft. long, saving 14,500 ft., $600,- 00.

In addition plans for $1,000,000 orth of the work to be done in con- ructing a high-level bridge across e Monongahela River at Dravosburg e complete. This project, which is cost $3,500,000, will provide a 50-ft. dway between curbs and two 10-ft. sidewalks. Plans for the entire project are soon to be submitted for approval to the public utilities commission of the state.

Allegheny County has a $1,410,000 fund on hand to start the projects and plans to raise the remainder via general obligation bonds. The county will be asked to pay most of an estimated property damage of $5,000,000 to $6,000,000 on $20,000,000 Pitt Parkway over which routes 22 and 30 will travel from outlying Wilkinsburg into downtown Pittsburgh at Grant and Water streets.

Two Michigan cities unite on one airport

Benton Harbor and St. Joseph, Mich., which recently acted to provide one sewage disposal plant to serve both cities, now have voted to cooperate in the joint ownership and operation of an airport. City commissions of the two cities adopted ordinances for the joint ownership and operation of Ross Field and have approved the appointment of a Twin City airport board composed of four members from each city, according to the American Municipal Association.

Benton Harbor made an initial investment of $27,000 in the airport. St. Joseph will make an immediate investment of $16,000, the amount being proportioned according to the assessed valuation of the two cities. Grading work is now in progress for the construction of longer runways.

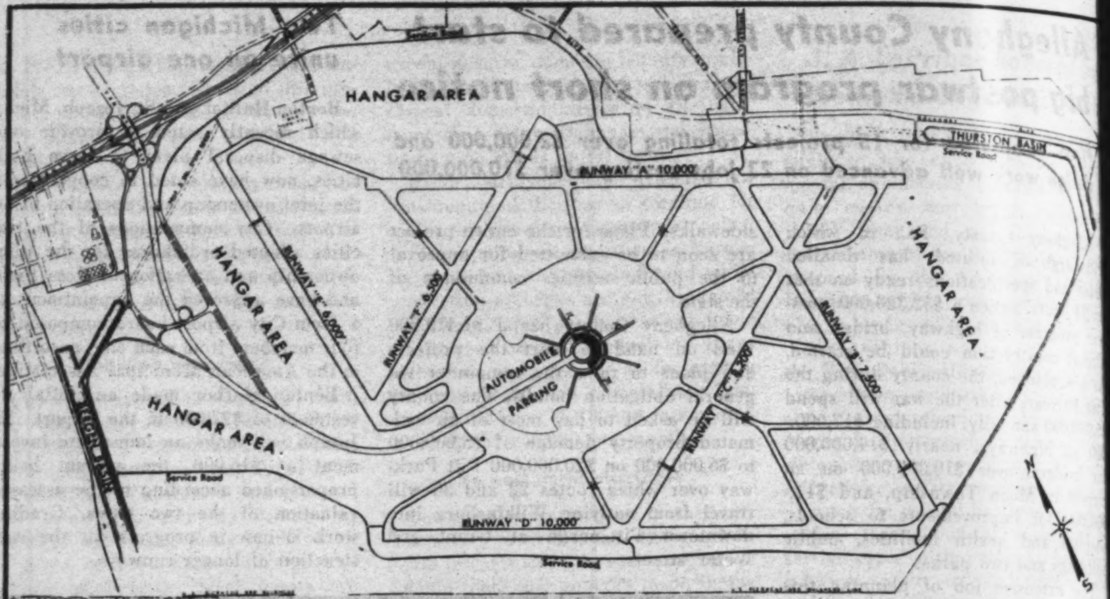
Bolivian engineer works with Oregon road department

First "Good Neighbor" engineer to work with the Oregon State Highway Commission under a plan endorsed last February, (ENR, Mar. 2, Vol. p. 300), is Raul Valle Rodas (left) from Bolivia, now in Oregon for one year's training with that state's highway engineers.

Mr. Valle initiates the program designed to familiarize Latin Americans with United States' construction techniques, to give this country the benefit of their services, and to promote public relations between the continents. His training will include work in maintenance, construction, planning, and the testing of materials.

The Oregon commission's "Good Neighbor" plan developed from an idea advanced by Charles M. Upham, director of the American Road Builder's Association. R. H. Baldock, Oregon state highway engineer, shown with Mr. Valle, after serving as a delegate from the United States to the Third Pan American Highway Conference in Santiago, Chile, in 1939, strongly advocated the training policy.

Mr. Valle, who received his B.S. degree at the Universidad Mayor de Sn. Andres, La Paz, Bolivia, came to the United States in December, 1942, holding a fellowship under the auspices of the Institute of International Education. He received a civil engineering degree from Princeton University last summer and has worked in the materials testing laboratories of the California Highway Department and the Public Roads Administration.



Data: N. Y. City Dept. of Marine and Aviation.

Bids to be asked soon for New York's Idlewild airport

Bids for the work on a 10,000-foot runway for the new Idlewild Airport, New York City will be advertised in September according to present plans, it was announced by Mayor F. H. La Guardia on Aug. 9.

The design officially made public includes six runways, of which two will be 10,000 feet long. A third will be 8,200 feet long, another 7,500 feet, another 6,500 feet and the sixth 6,000 feet in length. The city has approved for early construction runways A, 10,000 feet, B, 7,500 feet, and C. 8,200 feet.

An administration building and control tower, estimated to cost $7,500,000, will be at the center of the web of runways. The two 10,000-foot runways will be parallel, 6,200 feet apart and running southeast and northwest, with the Administration Building midway between. To the east of the administration building the 7,500 and 6,200-foot runways extend at angles between the 10,000-foot runways, crossing each other near their northerly ends. The 6,500 and 6,000-foot runways make a similar pattern to the west of the administration building.

Jay Downer, engineer of the airport, said: "The runways at Idlewild have been planned to meet the needs of planes weighing up 300,000 pounds. The largest plane weighs 90,000 pounds. The runways can built before the end of the war because do not require critical materials, but ably not the steel buildings."

It has been disclosed by city officials the estimated total cost of construction the current phase of the project is $47,96 000, which includes: land, $6,329,00; drainag $30,100,000; roads and bridges, $2,730,00 administration building, $7,500,000; C Aeronautics Administration buildings, $500 000; utility building, $500,000.

Postwar outlook good for New York City finances

New York City has a borrowing capacity of $273,582,144 inside its legal debt limit of 10 percent of assessed valuations, which is the largest margin since 1935, said City Comptroller Joseph D. McGoldrick in a recent report on city finances to the board of estimate and the city council. At the same time the comptroller indicated that the city might count on the availability of three-quarters of a billion dollars for a six-year public works program. Citing the city's "splendid financial condition," Mr. McGoldrick said it would be possible to float $150,000,000 of bonds to take care of the first year of the program, and that thereafter about $100,000,000 could be sold each year.

In referring to New York's current $1,300,000,000 postwar public works design program, the comptroller pointed out that its construction was planned to relieve depression unemployment after the war, and that on that score federal and state aid was expected. He suggested that a "substantial portion" of the total program be included in the new capital outlay budget, soon to be up for consideration.

• • •

Serious road conditions reported in California

Restrictions of the War Production Board against construction of new highways and the reconstruction of old roads were blamed recently by Charles H. Purcell, California's state director of public works, for a serious highway situation rapidly becoming acute.

In a report submitted to Gov. Earl Warren, Mr. Purcell declared that many structures and miles of worn out highway surfacing which normally would be replaced are required to be kept in operation indefinitely because of WPB restrictions.

Mr. Purcell's report stated:

"A 40 percent increase in vehic tonnage since the war and heavy w industrial hauling on many miles roads, which were not designed for su loads, are accelerating the normal ra of surface deterioration.

"Other factors which must be co tended with are the difficulties in pr curement of new maintenance equi ment and repair parts, and the ma power shortage."

• • •

Long pipeline planned by California utilities

In an effort to replace southern C ifornia gas reserves depleted by w demands, California utilities are co templating a $45,000,000 pipeline tap midcontinent fields. A. F. Bridg general manager of the Southern Cou ties Gas Co., testified Aug. 5, at hearing before the California Sta Railroad Commission which was held Sacramento.

ontractors on Pacific Coast told o get behind postwar planning

GC officers cite danger of another WPA unless action is taken obtain speedy passage of bills now before Congress

Western contractors were strongly ed by national officers of the Associ- d General Contractors at a meeting San Francisco Aug. 18 to join in the ional drive to force postwar con- ction planning to the contract let- g stage. William Muirhead, AGC ional president, and H. E. Foreman, naging director, emphasized the ne- ity of getting highway, flood control, igation and rivers and harbors bills the floor of Congress and passed. ns must be lined up so that con- ction can begin immediately at the e of the war to help fill the tremen- s demand for jobs, they declared.

Members of the Northern and Cen- l California chapters and representa- es of the AGC from other western es were told by their national officers t active planning to safeguard the nstruction industry's future, postwar ployment and selling of the con- ruction industry to private companies d individuals are problems facing ery contractor in the country.

Intimating that certain forces in ashington are attempting to block ongressional bills calling for wide- read peacetime construction, Mr. uirhead reminded his listeners that e far-reaching highway bill has been gged down since June. To assure that nstruction bills now before Congress ill become law before major changes ccur in the European situation, Mr. uirhead urged the contractors to e their best interests to influence eedy action in Washington. While affirming the necessity of preserving rivate enterprise, he warned of the ngers of a large federal works bill, nother WPA, if other bills were not ssed.

Recognizing the construction indus- y as a great influence on postwar em- loyment, Mr. Foreman outlined work head to insure that the coming transi- on period takes place with the least ssible eruption. "With the comple- n of the war and the discharge of the med forces, the construction industry alizes it must keep in the forefront e preservation of the individual's ght to venture and to progress by his n ingenuity," he said. "We can't eeze the status quo and must permit d help discharged servicemen to get o the contracting business."

Western contractors were also re- inded that the AGC is on record declaring that postwar construction must be two-thirds private to one-third Federal to maintain a balanced economy, and that the government should undertake only construction of works with a national interest. At the same time, the national association is insisting that the private purchaser have the same priority as local government units in the purchase of war surpluses, according to Mr. Foreman.

In the matter of a public relations program to sell the construction industry to everyone in order to encourage the investment of risk capital, Mr. Muirhead said the individual contractor should start with the lowest of his own employees and work up through his own organization.

The fact that the construction industry has accomplished the impossible in the last three years, after ten years of being on the defensive, was cited as the key to an advertising campaign to safeguard the industry's future and insure that it is not put on the defensive again. officials said.

Millions appropriated for Texas road work

On August 1, the Texas State Highway Commission appropriated $8,736,362 for maintaining the state highway system for the fiscal year beginning September 1. The maintenance appropriation averages $5 per mile more for the fiscal year 1944-45 than for 1943-44 —$332 per mile compared to $327 maintenance allowance for the past year.

The increase in maintenance allowance was essential because of the wartime highway construction lag in Texas. The highway commission on the same day let the greatest monetary amount of low bids at one time since the war began, the total being $2,028,619.70.

• • •

Missouri flood damage $112,000,000 in two years

The Missouri River and its tributaries flooded approximately 1,555,000 acres of land in April, 1944, and caused estimated damage of $31,000,000, Lt. Col. Delbert B. Freeman, district engineer at Omaha says. Damage in May and June has been placed at $16,000,000.

Added to $65,000,000 damage last year the total was $112,000,000 in the last two years, 4,515,000 acres having been flooded.

Phil Stroupe photo

Speedup of postwar plans topic of discussion

William Muirhead (seated at left), national president of the Associated General Contractors and H. E. Foreman (seated at right), managing director of the AGC, discuss postwar planning with, left to right: George Williams, president of the Central California chapter; Harry A. Dick, national vice president of Portland, Ore., and Howard Huntley, president of the Northern California chapter.

Rebuilding of Knoxville airport nears completion

An improvement program for the Knoxville, Tenn., airport near Maryville is approaching completion. The $1,500,000 project includes moving 1,300,000 cu. yd. of earth and surfacing two runways, each a mile long, in four months' time. The two runways—N-S and NE-SW—are in line with the wind 90 percent of the time.

Soil under the runways has been compacted to 95 percent or better of optimum, and a 5-in. subbase of 90 percent rock is rolled to 97 percent or better compaction. Over this a 9-in. thick, 150-ft. wide runway of concrete is laid in 25-ft. lanes. Taxiways from the airport building to the ends of the runways are 50-ft. wide. A 34E double-drum paver has laid 1,500 ft. of 25-ft. lane daily.

Pittman Construction Co., of Atlanta, is the general contractor and is doing the paving work. Harrison Construction Co., Inc., of Pittsburgh, has a subcontract for the earth moving, using "pans" hauled both by crawler and wheeled tractors and bottom dump trucks loaded by shovel and elevating grader. Olson and Eller are subcontractors on the subbase, and Drainage Corporation has installed the drainage facilities.

Harwood Beebe Co., of Spartanburg, S. C., are engineers, with work directed by the Civil Aeronautics Authority and supervised by the Navy, which until recently was using the field for its training program.

Florida court decision upholds WPB's order L-41

As a result of a decision it won in a Southern Florida case recently, the regional office of the War Production Board at Atlanta, Ga., has given notice that it plans a strict enforcement of the federal building restrictions in the southeastern region.

Violation of the WPB construction order L-41 has been too prevalent in the region, the regional WPB office comments, resulting in the use of much material and manpower that should not be diverted from war work.

The WPB's authority, under the Second War Powers Act, to stop construction that is in violation of orders was upheld recently in the United States district court in southern Florida, when Judge W. Holland made permanent a federal court injunction halting work begun by Sam Resnick some months ago.

Resnick started a building with used materials and the labor of friends and relatives, claiming that the job when completed would not exceed the maximum of $200 which under terms of WPB's L-41 construction order is allowable without specific authorization. The builder contended that workmen "paid by a friend," should be considered "unpaid labor."

The court interpreted the phrase "paid labor" as used in the WPB order to mean "paid by anyone", and that this was the War Production Board's intent in the order, a wartime regulation for conserving critical materials and labor.

The court furthermore refused to allow the defendant to continue the work himself, contending that while permission to do so would be within the letter of the law, it would be in violation of the spirit, as labor paid for by friends had already run the cost of material and paid labor, above the $200 allowed under terms of the order. "The donated labor cost cannot now be withdrawn—", it was ruled, "and to permit the defendant to go on would give him an advantage over others to which he is not entitled."

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Miami, Fla., commissioners, in a surprise move this month, repealed the $8 a year municipal garbage tax effective after the collection of semi-annual payments due Aug. 1. The tax will officially expire next Feb. 1, though final payments will be made during August and September. The action was taken at a special budget meeting, the International City Managers Assn. reports.

Large maritime saving b renegotiated contracts

Total savings of more than 200 lion dollars by the U. S. Mariti Commission through contract renegoti tions by its price adjustment boar since inception of the board two yea ago, was announced this month by t Commission. Processing about 2,00 cases, the commission effected price r ductions of $217,615,931 on renegotiab sales and excessive profits at a tot government expense of $300,000.

A total of 345 contractors were foun to have realized excessive profits on r negotiable sales of $2,104,299,311, t total amount recovered being $140,81 831. Clearance was granted to 3 firms with renegotiable sales totali $416,228,686, where no excessive pro was realized. Further price reductio of $76,804,100 were effected through r negotiation with respect to contracts i force and subject to further review i volving renegotiable sales of $511,280 247.

Because efforts of the commissio are now being directed primarily to th production of vessels needed to me military requirements, the merchan ship construction schedule of the com mission is slowing down. Commissio yards delivered 126 ships with an a gregate of 1.274.433 deadweight tons i July, bringing the year's productio figures to 990 ships of 9,901,984 dea weight tons. In the correspondin seven months of 1943 the yards ha delivered 1,037 vessels of 10,483,33 deadweight tons of generally simple designs.

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Portland approves funds for public works progra

Citizens of Portland, Ore., recentl voted three bond issues and a specia tax levy to provide $24.000.000 fo postwar public works as outlined i the city's postwar planning report, ac cording to the American Society o Planning Officials. The funds wer made available by a joint program o four local government units—the city dock commission, the county and th school district.

As a result of this coordinated ef fort, citizens of Portland approved $12,000,000 bond issue for a sewag disposal plant and intercepting sewers; $3,000,000 for harbor and dock facili ties; $4,000,000 for improvement o county roads; and $5,000,000 for im provement of school buildings and edu cational equipment. The $5,000,00 for schools was approved in the for of a special tax levy of $1,000,000 fo five years.

MEN AND JOBS

aul Christy, Zanesville, is succeed- **Edgar L. Mill**, Mt. Vernon, as resi- t engineer, Division five, Ohio State hway Department, with headquar- in Newark. Christy for the past r years has been assistant planning ineer for divisions three and five.

. Col. N. W. Haner, who recently rned from an overseas assignment has been stationed at Providence, I., has been transferred to the Wil- gton, N. C., U. S. Engineers Office duty as acting district engineer, ding the assignment of a permanent ineer.

Arthur E. K. Bunnell, civil engineer Toronto and partner in the consult- firm of Wilson and Bunnell, has appointed consultant on commun- planning for the Ontario Depart- nt of Planning and Development. In ent war years he has been director utilities in Toronto, acting under the vice administrator of Canada's War- e Prices and Trade Board. He is technical director for the Toronto planning board and will combine se duties with his new work with the tario government.

eabee Harold Koopman, who is serv- in the Pacific, has been promoted the rank of lieutenant commander. oject engineer for the Kent County d Commission, Grand Rapids, Mich., 19 years and before that with the te highway department, Lt. Comdr. opman is now doing important work h a naval construction battalion.

Thomas J. Coffey has been appointed erintendent of public works in Al- , N. Y.

loyd Y. White has been appointed cific Coast representative for Morris Van Wormer, New York City man- ment and consulting engineers. ite, who has established offices in Rialto Building, is well known in Bay area, having been district man- r for H. H. Robertson Co. from 9 to 1939.

. W. Fleming of Quebec has been pointed district engineer of the rthern Ontario district of the Cana- National Ry. at North Bay, Ont.

. J. Wheeler, Muscatine, Ia., with Muscatine County engineer's office e 1929, has been named county en- er to succeed the late F. P. G. lbfass.

Maj. W. T. Burt, Jr., former civil engineer with the Sun Oil Co. at Houston, Tex., has been transferred to the Allied Military Government headquarters in England.

Capt. Leonard W. Bindon, with the U. S. Engineer office at Seattle, Wash., has been assigned as area engineer at Great Falls, Mont., and placed in charge of all military construction in that state. He succeeds **Maj. Sidney Stern**, transferred to Ft. Leonard Wood, Mo.

C. F. Merten has been reappointed Hancock County engineer with headquarters at Garner, Ia., after some time in the Army.

J. B. Tiffany, executive assistant to the director, U. S. Waterways Experiment Station, Vicksburg, Miss., has been promoted to the rank of captain in the Corps of Engineers, U. S. Army, according to an announcement by Brig. Gen. Max C. Tyler, president of the Mississippi River Commission. Captain Tiffany, as a civilian, was in charge of the station's hydraulics division.

William L. Bratz, former construction surveyor for Dallas, Tex., is platoon sergeant with the Marines in the Pacific. He studied civil engineering at Southern Methodist University.

The Jefferson County, Ala., commission has appointed **Claud J. Rogers** county highway engineer, succeeding **D. A. Helmich**, who entered the Navy. Mr. Rogers, who served in the same capacity in the late 1920's, has been acting county engineer.

Ray Reese, Corning, Ia., has been named acting county engineer of Adams County, Ia., in the absence of **Carlton H. Vernon**, who is now in the Navy.

Erskine P. Garrison, of Raleigh, N. C., who prior to entering the service in December, 1942, was connected with the U. S. District Engineers Office at Wilmington, N. C., has been assigned to the Coast Artillery School at Fort Monroe, Va., where he has the rank of sergeant.

Drue L. Murrell, formerly construction superintendent for L. H. Lacy Construction Co. and the Uvalde Construction Co. of Dallas, Tex., is now a lieutenant-commander with the Seabees, being abroad.

Henry H. George, III, has succeeded **Walter H. Taylor, III**, as director of public works of Norfolk, Va. The change is because of the retirement of Mr. Taylor, who has been in the employ of the city 49 years. Mr. George has been assistant city engineer of Norfolk seven years. He received a degree in civil engineering at Cornell University in 1912.

William Luther Isenhour, Jr., of Charlotte, N. C., has been commissioned an ensign in the United States Naval Reserve. A graduate of North Carolina State College, he was a general contractor prior to entering the service.

Norwood Michie, Durham, N. C., civil engineer, now is engaged in confidential research in the physics department of the University of North Carolina at Chapel Hill, N. C.

City Engineer Ivor Strong of Swift Current, Sask., recently was appointed assistant city engineer of Calgary, Alta.

C. N. Baumann, of Asheville, N. C., who was employed by that city as a civil engineer prior to his enlistment in the Marine Corps in 1942, is a warrant officer with combat engineers in the South Pacific. He recently led a detachment of engineers in an island invasion.

Richard Lee Rice of Raleigh, N. C., has been promoted to captain with the Army Corps of Engineers after service in North Africa, where he was awarded the Silver Star for gallantry in action.

Col. Paul M. Ellman, Army Corps of Engineers, has assumed command of Camp Sutton, N. C., succeeding **Brig. Gen. Lehman W. Miller**, transferred. A native of St. Louis, Mo., Col. Ellman received his degree in civil engineering from Washington University and entered the Army in 1917, serving in the first World War. His assignments since have included two tours of duty in the office of the Chief of Engineers in Washington in 1919 and 1928, and service at San Antonio, Tex., Fort Logan, Colo., and in Hawaii. While assigned to the New York Engineering District from 1935 to 1939, he had charge of work on the Winooski valley flood control project in Vermont. He has just completed 18 months of service in Africa and Italy with an amphibious engineer regiment that he trained.

JOBS OF THE WEEK

DREDGING, Anahuac, Tex.

Atlantic, Gulf & Pacific Co., Houston, Tex. has been awarded a contract for dredging 41,166,000 cu. yd., by U. S. Engineers, Galveston, at 4.91c per cu. yd. Estimated cost is $2,021,250.

ADDITIONAL STOREHOUSES, Scotia, N. Y.

John A. Johnson Contracting Corp., Brooklyn, N. Y., has been awarded a contract to build 4 additional storehouses, by Bureau of Yards & Docks, U. S. Navy, Wash., D. C. $1,468,857.

CHEMICAL PLANT, Pasadena, Calif.

Southern Acid & Sulphur Co., Houston, Tex., will build a chemical plant to cost $3,750,000. United Engineers & Constructors, Houston, Tex. has been awarded the construction contract. Dorr & Co., Inc., New York, is engineer.

AIRPORT IMPROVEMENTS, Parkersburg, W. Va.

Wood County, Parkersburg, received bids for improving airport. Ralph Meyers, Salem, Ind., and Western Contracting Corp., Sioux City, Ia., were low on bid 1, for excavation, at $1,655,255. William Construction Co., Middle River, Md., was low on asphalt paving at $580,350, while Allegheny Asphalt & Paving Co., Pittsburgh, Pa., was low on concrete paving at $647,914.

PLANT ADDITION, Amarillo, Tex.

A. J. McKenzie Construction Co., San Antonio, Tex., has been awarded a $5,750,000 contract for enlarging the capacity of the Cactus Ordnance Plant by the Defense Plant Corp., Washington, D. C. Pantex-Certain-teed Ordnance Plant, Dumas, are operators.

MAGAZINES, Port Chicago, Calif.

Barrett & Hilp, San Francisco, Calif., have been awarded a contract for magazines and storage building at Inland Storage Area to cost $5,296,848. Contract was let by the Bureau of Yards & Docks, U. S. Navy, Washington, D. C.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 155.

Two big bridges to head Louisiana program

Construction of a $15,000,000 highway bridge spanning the Mississippi from near the business center of New Orleans appears to be the most certain postwar project on the agenda of the Louisiana Department of Highways. The Louisiana legislature has approved the project.

The highway department is going ahead with plans worked out jointly with the Public Roads Administration. Financing of preliminary work has amounted to $395,430. According to Herry B. Henderlite, chief highway engineer, the bridge will be jointly federal-state financed and will be toll free. Being located within the port it will be a high level structure.

A second major project, authorized by the legislature, is the construction of a bridge or causeway spanning Lake Ponchartrain. This would connect New Orleans and either Mandeville or Madisonville, and would be about 20 miles long.

The water depth for most of the distance runs from 12 to 15 feet. This structure may be either a highway causeway or designed for joint use with a railroad. If accommodating a railroad, 60 percent of the cost must be sustained by the carrier and 40 percent by the highway department. If desirable, the highway department may hold title and lease facilities to a rail carrier. Such a project was promoted almost 20 years ago at which time its cost was estimated at approximately $20,000,000.

The state highway department was also specifically authorized by the legislature to construct structures for:

Spanning the Red River, connecting Bossier and Caddo parishes, near the Arkansas state line. This would have to be a high level structure to provide clearance for barge lines and other navigation.

Spanning Bayou Plaquemine, at Plaquemine, La., a smaller structure than required for the Red River crossing.

Providing a crossing over the Amite River, on State Route 331, in Livingston parsh, at the present site of Bayou Pierre ferry.

Spanning Twelve Mile Bayou Drainage Canal at the point formerly known as Tim Mooring's Ferry.

Highway bill approved by Senate committee

The post road committee of the Se ate, Aug. 22, reported favorably a b S. 2105, that would make $650 mi lion of federal funds available duri each of the next three years for hig way work. The bill requires the sta highway departments to supply 40 pe cent of the cost of a project as again 60 percent furnished by the feder government.

Of the yearly total $250 million earmarked for projects on the stra gic highway network or primary hig ways and $200 million for seconda roads. The distribution of this mon would be based one-third on a state post road mileage as compared to th country's total, one-third according population, and one-third on area.

The remaining $200 million of th total would be available for highw work in urban areas of 5.000 popul tion or greater. This money would distributed according to the ratio whi the cities of 5,000 or more in each sta bears to total population of such citi in all states.

The House of Representatives as y has passed no highway measure: th bill being studied by that body is st in committee. Much work is se necessary before agreement can reached on the most suitable meth of distributing federal-aid funds; it believed that the House will want th more thickly populated states to r ceive a greater share of the fun than is possible with the Senate bi

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Filing of postwar plans begun in California

Positive action to assure the ra development of a statewide constru tion program was taken in Califor Aug. 17, when State Finance Direc James S. Dean advised counties a municipalities they may start filing a plications for state funds to aid th in preparing plans and purchasing si for postwar projects.

Director Dean's actions were in cordance with a program adopted the June session of the California l islature, which appropriated $10.00 000 for allocation on a matching ba with a minimum of $10,000 per coun for plans and $6,000 for sites. T balance will be distributed on basis of the 1940 population cens

Local agencies will be permitted engage jointly in carrying out a proje Director Dean recently advised the lo officials that a city or a county assign part or all of its allocation to a other tax-supported local agency.

OBITUARY

amuel M. Ellsworth, 49, consulting itary engineer, with offices in Bos- Mass., and ident of the on Society of l Engineers, d at Brattle- , Vt., on Aug. Mr. Ellsworth graduated the Massa- setts Institute Technology, in 1916, and in his ly career was connected with the ssachusetts Department of Public alth and the U. S. Public Health vice.

Mr. Ellsworth was a lieutenant of ineers in an AEF water supply regi- t in World War I, after which he s associated with Morris Knowles. , Pittsburgh, Pa.; Weston & Samp- , Boston consultants; and the New sey District Commission on water pply for Newark and other major ters in that area. From 1926 to 1932 was with Metcalf & Eddy, Boston ineers. Later he entered private ctice in the fields of water supply, age, waste disposal, and general itation. He was consultant for the tional Resources Board for New gland on river and harbor sanita- ; a member of the Boston work jects board; and consultant on ter supply and sewerage for the U. S. litary reservation at Camp Edwards. ss.

Major Alexander C. Newton, who ceived his degree in civil engineering North Carolina State College. leigh, N. C., in 1933, was killed in ion in France on July 29. Prior to service in France, Major Newton ved with the Army Engineer Corps Iraq, Syria and Palestine. He was ative of Westwood, N. J.

Elmer O. Norris, 54, organizer of Norris Construction Co., Boston, ss., a native of Everett, Mass., and eran sergeant of the 101st Engi- rs in World War I, died at Pem- ke, Mass., on Aug. 11.

Chester Smith, 53, a retired build- contractor, died Aug. 15 in Dade y, Fla.

Harold McIntosh, general superin- dent for the Priester Construction , Davenport, Ia., for 15 years, died y 22 at Davenport of a heart attack.

Arthur L. Lehr, senior partner in the Lehr Construction Co. at St. Joseph, Mo., died Aug. 14 from a heart attack at the age of 62.

William H. Bucksbarg, Sr., 72, for 25 years superintendent of construction for the Ohio Power Co., died Aug. 13 at his home in Canton, Ohio. He retired seven years ago.

Melvin D. Wing, 70, contractor died Aug. 12 in Springfield, Ill. He and his brother, Edward, were together in the contracting firm of Wing Brothers from 1900 to 1922. In 1916, under orders from Governor Edward Dunne, they constructed two cantonments for the Illinois National Guard, one Camp Dunne and the other, Camp Lincoln. His brother has been in Chicago since 1922.

William E. Saunders, 81, retired consulting engineer, died Aug. 10, at his home in San Diego, Calif., where he has lived since 1929, following his retirement from the Philadelphia Gas Co.

Edward Olriksen, manager of the general materials and equipment department of the Robert W. Hunt, Co., Chicago, Ill., since 1928, died suddenly on July 28, 1944. Mr. Olriksen was born April 14, 1888, at St. Paul, Minn., and entered the employ of the Hunt Company in 1907 as an inspector of engineering materials. Prior to that he had been engaged in the maintenance of equipment on the Great Northern R. R.

Virgil Thomas, 49, superintendent of the Gay-Coleman Construction Co., died unexpectedly Aug. 1 in Pike County, Ky. He had been in the contracting business 32 years.

Fred Lanpert Grennor, 61, deputy superintendent of the Atlanta, Ga., waterworks, died in Atlanta Aug. 4. At the time of his death he had been with the waterworks for 45 years.

Erick Andrew Johnson, 72, construction superintendent for the Los Angeles, Calif., Department of Water and Power, died Aug. 8 in Los Angeles.

Lawrence Wood Robert, 85, a pioneer engineer and builder in Georgia, died Aug. 17 in Atlanta. Mr. Robert was engineer for the Georgia-Pacific Ry., now the Southern Ry., between Birmingham and Atlanta, and spent several years developing railroads in the coal and iron districts of Alabama. Since 1918 he has been associated with Robert & Co., Atlanta.

Work on Memphis bridge expected to start soon

Work on the substructure of a four-lane highway bridge across the Mississippi River at Memphis, Tenn., will probably get under way within the next two or three weeks, according to Thomas H. MacDonald of the Public Roads Administration. Mr. MacDonald said he had been assured by the War Production Board that critical materials needed in construction of the bridge will be made available.

The bridge is to be located just to the south of the Frisco R.R. Bridge and the Harahan Bridge, which has been outmoded.

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Mexico plans to build large textile center

The Mexican government recently announced plans to build a $5,000,000 textile center for manufacture of cotton goods at Hemosillo, capital of the state of Sonora. The Mexican-American economic commission has approved the project, and the U. S. has announced it would grant priorities for the building materials and machinery.

While the major cost will be federal financed, the plant will be owned and operated by the state of Sonora, of which Former President Abelardo L. Rodriquez is governor.

WEEKLY CONSTRUCTION SUMMARY

CONTRACTS

Continental U. S. Only
(Thousands of Dollars)

	Week Ending Aug. 26 1943	Aug. 17 1944	Aug. 24 1944
Federal	$26,703	$31,995	$27,641
State & Municipal	2,870	7,540	4,511
Total public..	$29,573	$39,535	$32,152
Total private.	11,065	2,800	5,157
TOTAL	$40,638	$42,335	$37,809

Cumulative
1944.......(34 weeks).......$1,201,360
1943.......(34 weeks).......$2,224,088

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1943 34 Weeks	1944 34 Weeks
NON-FEDERAL .	$272,888	$331,492
Corp. Securities	15,408	91,845
State & Mun...	97,347	99,857
RFC Loans ...	9,060	56,790
FPHA Loans..	3,133	....
REA Loans ...	20,000	20,000
Fed.-Aid Hwy.	128,000	63,000
FEDERAL	$2,653,838	$1,263,800
TOTAL CAPITAL	$2,926,726	$1,595,292

ENR INDEX NUMBERS

Index base=100		1913	1926
Construction Cost	Aug. '44	300.42	144.41
Building Cost....	Aug. '44	236.09	127.62
Volume	July '44	114.	50.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Adjusting Precise Traverses

Sir: In *Engineering News-Record* of May 4, 1944, 650, C. L. Garver, Chief, division of geodesy, U. S. Coast and Geodetic Survey, discusses the length factor-progression method of precise traverse adjustment which appeared in the March 9, 1944 issue p. 344. His criticism is based on an analysis of the assumed traverse that was used in explaining the method.

In setting up that assumed traverse I was only seeking to find one having azimuth lines in each quadrant and little attempt was made to accurately work it out so as to get the reasonably precise relationship between lengths and azimuths that would hold for a precise traverse actually run out in the field. Due to this fact the analysis made by Mr. Garver does not give a true picture of the precision of the length factor-progression method of adjustment.

With Mr. Garver's criticism in mind, I have computed the values given in the following tables for the actual traverses Prosser to Wanda, Wanda to Mason, and 325 to Mason.

COMPARISON OF ADJUSTING TRAVERSES BY COAST & GEODETIC SURVEY AND LENGTH FACTORS—PROGRESSION METHODS

TRAVERSE—Prosser to Wanda

Section	Change in Length, One part in—		Change in Angle, Seconds		Change in Azimuth, Seconds	
	C. & G. S.	L. F.-Prog.	C. & G. S.	L. F.-Prog.	C. & G. S.	L. F.-Prog
Prosser—325	98,800	65,800	3.9	1.2	3.9	1.2
325-326	48,000	55,400	2.1	1.2	0.6	2.4
326-327	34,600	34,600	0.4	1.1	2.2	3.5
327-328	65,200	53,400	0.4	2.6	3.6	6.1
328-329	305,600	76,300	0.2	0.5	3.8	6.6
329-330	46,400	50,100	3.1	1.5	0.7	5.1
330-331	66,500	59,100	2.2	0.2	2.9	5.3
331-332	126,100	63,000	1.5	0.9	4.4	4.4
332-333	649,500	64,900	0.2	1.7	4.6	2.7
333-Wanda	136,400	68,200	0.6	1.5	4.0	1.2
			4.0	1.2		
Average	157,700	59,100	1.69	1.24	3.07	3.85
Worst Cond.	34,600	34,600	4.0	2.6	4.4	6.6

TRAVERSE—325 to Mason

Section	Change in Length, One part in—		Change in Angle, Seconds		Change in Azimuth, Seconds	
	C. & G. S.	L. F.-Prog.	C. & G. S.	L. F.-Prog.	C. & G. S.	L. F.-Prog
325-324	28,000	18,300	7.9	0.1	7.9	0.1
324-323	21,600	18,200	12.7	0.1	4.8	0.0
323-322	19,800	18,000	4.9	0.0	0.1	0.0
322-321	20,200	18,500	1.7	0.3	1.8	0.3
321-320	20,100	18,200	0.2	0.5	2.0	0.2
320-319	22,800	18,600	7.0	0.1	5.0	0.1
319-318	20,200	18,200	7.7	0.3	2.7	0.0
318-317	20,400	18,000	0.8	0.0	1.9	0.0
317-316	22,200	18,600	6.8	0.2	4.9	0.2
316-Mason	21,000	18,500	4.3	1.9	0.6	2.1
			0.6	2.1		
Average	21,600	18,300	5.0	0.5	3.2	0.3
Worst Cond.	19,800	18,000	12.7	2.1	7.9	2.1

TRAVERSE—Wanda to Mason

Section	Change in Length, One part in—		Change in Angle, Seconds		Change in Azimuth, Seconds	
	C. & G. S.	L. F.-Prog.	C. & G. S.	L. F.-Prog.	C. & G. S.	L. F.-Prog
Wanda-334	138,300	276,600	10.6	3.4	10.6	3.4
334-335	424,700	212,000	2.5	3.0	8.1	6.4
335-336	254,000	254,000	1.8	3.5	9.9	9.9
336-337	143,200	572,900	0.1	3.8	10.0	13.7
337-338	90,400	105,500	0.4	2.3	6.5	12.9
338-339	32,100	59,700	1.1	1.1	8.5	14.9
339-340	57,400	516,300	1.2	2.3	9.7	12.6
340-341	311,300	624,000	0.1	3.9	9.6	9.3
341-342	321,000	214,100	0.3	2.9	9.9	6.4
342-Mason	45,800	274,500	0.1	3.5	9.8	2.9
			9.8	2.9		
Average	181,800	310,950	2.55	2.96	9.26	9.24
Worst Cond.	32,100	59,700	10.6	3.9	10.6	14.9

The adjustment of these travers the Coast and Geodetic Sur method is given in their Special P lication No. 194 entitled, "Manual Traverse Computation on the L bert Grid".

The angle and azimuth chan were obtained by comparing final adjusted values of the cou azimuths with the original muths adjusted for azimuth clos through the traverse. The adjustm by the Length Factor-Progressi method was made using the rates changes of the sines and cosines evaluating the progression consta This was easily done by substituti N (dy) for NL_s and N (dx) for in Column 6 of the adjustment ta on p. 345, in the March 9 issue.

A study of the results obtained adjusting these traverses by the t methods shows in general:

1. That the ratios of changes length are more uniform by length factor-progression adjustme and there are no poor results obtai when this method is used.

2. That the angle changes are consistently small when the len factor-progression method is used that they are inconsistent and of unreasonably large when the Co and Geodetic Survey method is us

3. That there is little to choose tween the two methods as far changes in azimuth are concern but that the changes by the len factor-progression method incre progressively to a maximum at center course while the changes the Coast and Geodetic Sur method do not vary in any fixed w

I would like to observe at this po that, to me, a comparison of m mum azimuth changes has much value as a method of testing the curacy of the adjustment than d the angle change comparison. A lo surveyor has no way of accurat measuring the actual azimuth of established line in the field, but can easily measure the angle betw two established lines, to within probable error of 5 sec., if he h good 20-sec. transit.

As far as time required to mak traverse adjustment by the len factor-progression method is c cerned, a computer can perform required work reasonably fast.

Although Mr. Garver states no method of adjustment is satis tory for all traverses, it would s the length factor-progression od is superior since it attacks roblem in a rational manner, al- ing to lengths and angles their r portion of the closing dis- ancy.

Russell I. Boyce,
Vicksburg, Miss.

e Table for Sewerage Work

r: The article published in *Engi- ing News-Record* May 4, 1944, p. 680, on the use of the plane performs a useful service on hasizing the value of the plane

r some years we have used the table for detail surveys for rage undertakings. Plans (50 ft. in.) are made in rolls 30 in. , the paper being held in a roll ped with an ordinary spring es peg at each end of the plane . To save back-bending and speed work, a tacheometer is set up im- iately adjacent to the plane table, an observer provides the stadia dings to the plane table operator. he method is very accurate, much r, and about ten percent cheaper any other.

Geoffrey I. Davey,
Gutteridge, Haskins & Davey,
Sydney, Australia

e Table vs. Transit

r: In the article "Plane Table s Transit for Topographic Map- g," printed in *Engineering News- ord*, May 4, 1944, p. 680, M. F. ault has brought out some strong ments in favor of the plane table topographic tool. For medium small scale mapping, the plane e is generally the preferable in- ment; however, the plane table— erhaps I should say the plane table grapher—is not well adapted to ain specialized types of mapping. he trained plane table topographer blishes the "bony structure" of the ain before him by means of a imum number of stadia shots egically placed along ridge and y lines, makes the necessary in- olations, and then—very skill- y—sketches in the contours. The t is a highly recognizable picture the terrain, achieved by use of the e technique that is employed by caricaturist—the subtle, and often nscious, exaggeration of detail. above procedure is entirely proper, when used on small scale maps made for preliminary and qualitative studies of the engineering possibilities of an area; but when the same procedure is used on medium and large scale maps, to provide quantitative data, the results are always inaccurate and often entirely misleading.

Contours on site topography, to be of value at all, must be as accurately drawn as the scale of the map permits. A frequently used criterion of accuracy requires that one should be able to determine the elevation of any given point on the map with an error amounting to less than one-third of the contour interval of the map. We have learned in descriptive geometry that any warped surface may be approximated by fitting a sufficient number of plane triangles to it.

The problem in site topography is to choose the location of the shots so that they form the vertices of adjoining plane triangles that fit the ground surface closely enough to conform to the criterion cited above. If the shots are so located, and the sides of the triangles are penciled in on the map, straight-line interpolations may properly be made along any of the sides. The task of drawing the contours through such a network of shots is purely a graphical one; it may be done in the field on the plane table, in the office on the plane table sheet, or in the office on a map plotted from the transit field notes; the results will be the same in any case. For this type of work, because of its greater speed, the transit is superior to the plane table.

For types of work within the proper sphere of the plane table, I have used the combined plane table and transit method of taking topography, and prefer it to either of the two conventional methods. In the combined method, the two instruments are set up about 6 ft. apart, the stadia shots are read and reduced by the transitman, while the plane table man aligns an open-sight alidade on the rod, and plots the called distance and elevation. The eccentricity of the two instruments is disregarded on small scale work, and corrected by simple graphical methods on large scale mapping. The method effects a better distribution of labor between the two members of the instrument team, and also takes advantage of the faster pointing of the transit telescope. The method shows to best advantage on medium scale work, being about 20 percent faster than the conventional plane table method on each work.

Mr. Denault's paper demonstrates his intimate knowledge of modern plane table procedure, but leads one to believe that he is not so intimately acquainted with the best modern practice of the transit method. The office method of plotting transit notes, described in the paper, has been obsolete for the past twenty years; and it has been fully fifteen years since I have seen any organization, that made a pretense of being equipped for topographic mapping, use any instrument other than the drafting machine for plotting transit topography. With the drafting machine, the hand and eye of the draftsman are the only factors that limit accuracy in plotting, and these same factors limit the accuracy of plane table plotting in exactly equal measure.

E. P. Bauer,
Austin, Texas

Oil and Oxygen

Sir: A picture in *ENR*, June 1, vol. p. 795 (part of which is reproduced here) is an illustration of an unsafe condition in handling oxygen cylinders. Oxygen by itself cannot burn but is compressed and sold for the express purpose of helping other things to burn.

When highly combustible materials come in contact with oxygen under pressure serious damage may result. For safety see that oxygen equipment is kept free from oil and grease, and that tanks are stored at a safe distance from combustibles.

L. F. Granger
Linde Air Products Co.,
Union Carbide and Carbon Corp.
New York

EDITORIALS

VOLUME 133 NUMBER 8

August 24, 1944

An Attainable Goal

A YARDSTICK OF POSTWAR NEEDS in sewerage and water pollution abatement facilities is furnished by the U. S. Public Health Service (see vol. page 537), which estimates the cost of meeting these needs at $2,255,000,000. At first glance this may represent a formidable total. But comparison with past performance in this field indicates that these needs could be met in a reasonable period of time. For example, if the program were to be completed over a 20-year period it would call for a yearly expenditure of less than $112,800,000. That such a program is within easy range of accomplishment is revealed by *Engineering News-Record* construction statistics, which show an average annual expenditure of $88,000,000 and a maximum of $160,000,000 for public sewage disposal facilities in the decade 1931-40. Even more heartening, is the picture to be obtained from a study of the *ENR* postwar statistics. These reveal that already there has been listed some $640,000,000 in proposed sewerage projects—this represents one-quarter of the U.S.P.H.S. program needs—and that plans for half of these projects are underway or completed. Presenting these facts in another way, it can be said that one-eighth of the total national sewage disposal program already is in the blueprint stage. This is an excellent start toward the goal of water pollution abatement envisioned by the Public Health Service.

Public Works Principles

WHETHER OR NOT CONSTRUCTION will be used again to relieve the unemployment of a depression (and it may be hoped that such a tragedy can be avoided), it is well to be prepared with some principles—some do's and some don't's—that are tested by experience. Moreover, many of these same principles are applicable to a normal public works program, such as is being planned for our postwar years. For example, it should be accepted that projects should be selected for the service they will render, and not primarily for the jobs that they will provide; that the most efficient construction procedures should be used; and that administration should be decentralized, and political control minimized. It is because a thinking acquaintance wit these and other principles is desirable that th article in this issue by M. W. Torkelson, the abl director of the Wisconsin State Planning Board deserves careful and wide reading. One likes t be more sanguine than Mr. Torkelson seems to b over the inevitability of a federal work-relief program, but should we have one some day the view he expresses will be important to remember. I the meantime his advice to local governments ha present significance: "Unless your proposed project is considered so necessary or desirable that you are willing to construct it some day, sometime alone and unaided, then the project should not b decided upon. If it is considered desirable, mak plans for it even though the finances are not i sight." Postwar planners could do no better than to paste that advice in their hats.

Different From Tacoma

ALTHOUGH THERE IS a natural tendency to compar the recent failure of the two-span continuous trus bridge at Chester, Ill., with that of the Tacoma suspension bridge in 1940, such comparison is profitable only to the extent that it makes clear the difference between them. Both failures occurred as result of wind action, but beyond that similarity ends. The Tacoma Bridge was a bold and unprecedented example of its type of design, hardly completed before it was wrecked by a wind having the quite ordinary velocity of about 40 mph. The Chester Bridge, on the other hand, was designed according to standard, conservative specifications, is quite similar to other bridges of its type in various parts of the country, and failed as a result of a wind that must necessarily have reached a velocity of over 150 mph. or else one that contained vertical components of wholly unpredictable magnitude. In brief, the Tacoma Bridge was an unusual structure wrecked by an ordinary wind, the Chester Bridge a conventional structure wrecked by the great forces of a tornado. This wide degree of difference extends also to the questions raised by the two failures. In the case of the Tacoma Bridge these questions are almost exclusively structural, while the Chester Bridge failure turns the spotlight on bridge design economics. How far can we afford to go in making our structures safe against possible but highly improbable wind loads? The Chester Bridge failure offers a good opportunity for re-examination of this fundamental question and of the wind design provisions in specifications through which bridge safety is controlled.

conversion Start Properly Timed

GOOD DEAL OF PRAISE is due WPB Chairman nald M. Nelson for insisting against powerful position that his four orders looking toward a umption of peacetime industrial activity should put into effect. Our great advances in France, litical and military unrest in Germany and anges in the Japanese high command do not cessarily mean that the end of the war is just ound the corner, but they do serve to emphasize t its outcome is under our control, and that the hting may well cease with great suddenness. ould such prove to be the case, the machinery r the reconversion start should at least be avail- le. These four orders provide some of this chinery, and set a pattern for more to come.

The military men who opposed the reconversion ders are properly concerned lest labor, badly eded in certain war industries for a long time to me, will be hard to hold in the face of reconver- on planning and the resumption of peacetime man- facture. This, however, would seem to be a prob- m to meet when it arises. Probably it can be voided entirely by proper administration of the conversion orders, particularly the last one which ermits WPB field offices, subject to War Man- ower Commission veto power, to grant approval fter Aug. 15 for certain companies to go ahead on eded civilian manufacture if the required labor, lant machinery and materials are not required r war work.

One of the important possibilities of this new pro- edure is that it may eventually afford opportunity start manufacture of products that will be needed hen postwar activity begins in earnest, but which ke a relatively long time to make. Many types f installed building equipment are in this class, nd their availability might save several months in etting construction effectively under way. The importance of "filling the pipeline" of building supplies at the earliest practicable time was brought WPB's attention Aug. 3 by the construction com- ittee of the U. S. Chamber of Commerce, which as given assurance that the problems of construc- on were receiving major attention.

Complete cooperation can be expected from the onstruction industry in such an approach to the conversion problem. Much of its supervisory ontracting personnel is marking time, and without omplaint, knowing that the first thing is to win the war. But it is also noting the progress on postwar designs being made by other elements of the construction industry, and is getting ready to start work when labor and materials are available. The rest of American industry should be equally well prepared for it is from it that the materials must come if construction is to start quickly and advance smoothly. The WPB reconversion orders are astutely timed to give industry aid and encouragement. It is to be hoped that industry will grasp the opportunity whenever it can be done without injury to war production.

Toward More Durable Concrete

ALTHOUGH MOST ENGINEERS and contractors are aware that extensive studies have been made of the effect of the use of air-entraining agents in concrete, many probably do not realize hom completely authorities have accepted such ingredients as aids toward increased durability. In so far as highway concrete is concerned, air-entrainment seems to be universally accepted. For structural concrete doubts are still expressed because of a loss of strength incident to the incorporation of air, but even here changes in mix design can largely overcome this disadvantage. In any event the principle of air entrainment is here to stay and, since the techniques of its application are beginning to crystallize, it is important that they should be widely understood.

For example, it is not the amount of air-entraining agent that should be controlled, as the first A.S.T.M. specification required, but the resulting amount of air. If strength is not to be seriously affected air should not greatly exceed 3 percent; in other words, unit weights should not be reduced more than from 148 to about 143 lb. per cu. ft. And where it is important to avoid loss of strength the mix should be redesigned by reducing both sand and water content by about the volume of the added air, thus in effect reducing the water-cement ratio.

Obviously, securing greater concrete durability by entraining air involves a good deal more than just adding a pinch of magic elixir. But by following the above principles and others outlined in the article in this issue, "How to Use Air-Entraining Cements," better concrete is definitely in prospect. How much better depends, as it always has, on the construction field men who do the proportioning, mixing and placing.

NGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor*

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How to Use Air-Entraining Cements

H. G. Farmer and G. L. Lindsay
Technical Service Director and Director of Tests and Research
Universal Atlas Cement Co., New York

Contents in Brief*—Introducing air voids into concrete paradoxically improves its resistance to freezing and thawing and to scaling, but the amount of entrained air must be carefully controlled, preferably by adding the air-entraining agent to the cement at the mill, since cements vary widely in their requirements. Minute air bubbles enhance workability and permit reduction of sand and water, thus reducing bleeding and segregation, and so improve durability. Air-entraining cements cause no appreciable loss in concrete strength (particularly in lean mixes) if the mix is adjusted by reducing sand and water content. For all mixes, more uniform strength results are possible with air-entraining cements.*

PROBABLY the greatest advance in cement and concrete making since the water-cement ratio theory is the discovery that air-entraining portland cement makes concrete pavements highly scale-resistant and more durable. The gain in durability results primarily from increased plasticity and workability and decreased segregation and bleeding, and manifests itself largely in a marked resistance to freezing and thawing and to scaling due to the use of de-icing salts on pavements.

In a practice so revolutionary as the deliberate introduction of air voids in concrete, it is noteworthy that, following the use of air-entraining cement for several scores of street, highway and airport paving projects installed since 1939 in over a dozen states and cities, there is substantial agreement regarding the resistance to freezing and thawing, the resistance to scaling and the resulting improvement in durability. Doubt, where it exists, is primarily concerned not so much with the idea of air entrainment, but with the amount, whether it can be adequately controlled, and what effect it might have upon the strength of concrete.

Difficulties, where they existed, lay in considering the governing factor to be the amount of air-entraining material added to the cement rather than the amount of entrained air produced. Where the amount of entraining agent added to the cement was adjusted to provide a controlled amount of entrained air, little or no difficulty has been encountered. This method of control is discussed subsequently, together with comments on the development of this cement, the adjustment of concrete mixes when using it, the theory of entrained air voids, and the effect of such voids on plasticity, workability, segregation, bleeding, strength and durability.

Original research and tests

For a number of years our research laboratories, state highway departments, the Portland Cement Association, the federal government and others sought means to resist the scaling of concrete pavements due to use of de-icing salts. Our early studies, begun in 1935, showed no advantage in any of the various types of cement

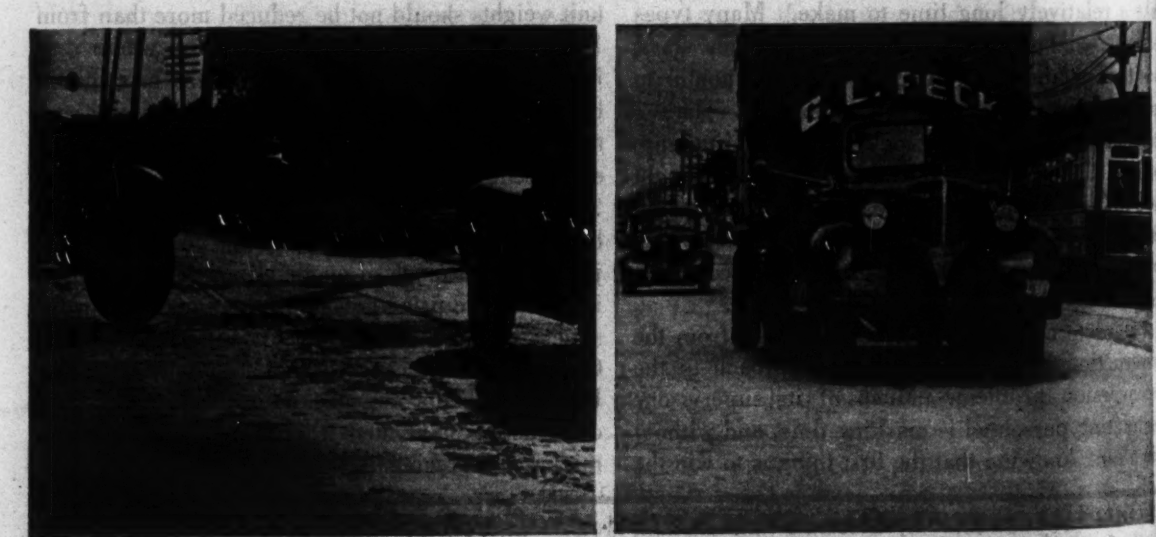


Fig. 1. Illinois state highway pavements on Archer Ave., Chicago, after two winters of salt de-icing treatment. Normal-cement concrete at left is badly scaled, while air-entraining-cement concrete at right is practically undamaged.

available. We then turned to a
of "plasticizing agents" to im-
workability and thereby reduce
egregation and bleeding which
ibute to scaling. Among the ma-
s studied, those which provided
est scale resistance also were
istently distinguished by an in-
ed slump and a lower weight
cubic foot of concrete. These
e characteristics, supported by a
accumulation of test data, are
led to the conclusion that in en-
ed air lay the solution of the scal-
problem.

verify the laboratory studies, we
a full-scale experimental road at
Hudson, N. Y., plant in 1938. The
inal report on this (*ENR*, Oct. 10,
, p. 471) showed that of the
ous cements, sands, entraining
ts and consistencies used in the
road and subjected to identical
unusually heavy repeated applica-
of calcium chloride for ice re-
al, the slabs without entrained
particularly those containing
s with an unsatisfactory service
rd, scaled badly and rapidly,
e all those with entrained air were
ly scale resistant. Best results
e obtained from the slabs made
normal portland cement with a
ll but precise amount of air-en-
ning material interground during
ufacture.

n the succeeding years, research
testing have continued in the lab-
tory, in the manufacture of the
ent and in the field. The results
various full-scale paving projects
structed in different states and
es have been published (Minneap-
pavements in *ENR*, Dec. 30, 1943,
950; Chicago, Milwaukee and Ap-
ton pavements in *Roads and
eets*, Nov., 1943, p. 57; various
o road installations in *Concrete*,
, 1944, p. 103). Of these and
res of other paving installations
lt with air-entraining cement in
past several years, some have been
jected to four and five winters of
mal service, and all have shown
rked resistance to freezing and
wing and to scaling due to use of
icing salts.

Amount of entrained air

Experience shows that for best re-
ts it is necessary to control the
ount of entrained air so that it
ll neither be deficient in some
es nor excessive in others. This

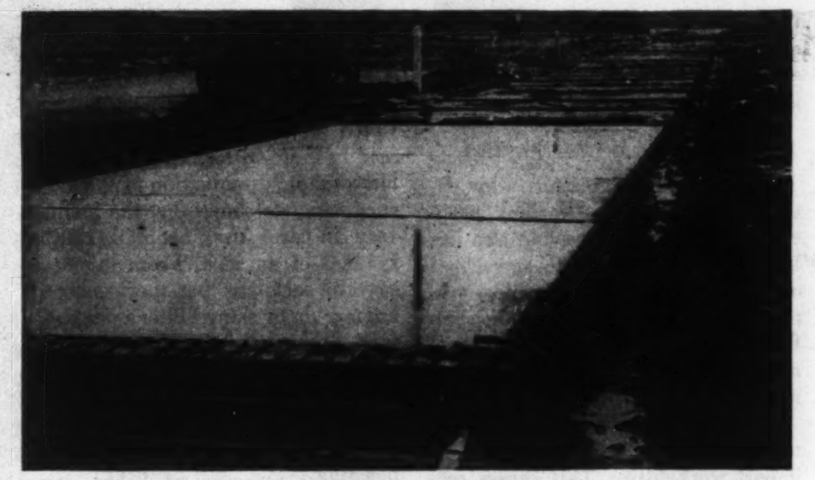


Fig. 2. Pole reflection in three 20-ft. test slabs shows comparative bleeding of concrete made with different cements. The slab in the foreground was made with normal portland cement, the middle slab with air-entraining cement, and the third slab with a blend of portland and natural cements. Absence of bleeding in middle slab is indicated by gap in pole reflection.

control of the entrained air rather than the addition to the cement of a given amount of air-entraining agent is the key to satisfactory performance. The distinction is important because the volume of entrained air depends not only upon the amount of entraining agent used, but also upon the characteristics of the cement to which it is added. A given amount of entraining agent added to different portland cements produces varying amounts of entrained air. Fortunately, the data accumulated in our tests of cement and concrete showed clearly that: (a) to establish the principle of entrained air it was necessary to make tests not only of the air-entraining cement, but more importantly of its effect upon concrete; and (b) in applying these tests to cements from our several plants, it was found necessary to vary the amount of air-entraining material used in order to produce a given amount of entrained air.

For evaluating the air-entraining properties in concrete, our research laboratories developed a standard concrete workability test. In this test the operator notes such characteristics as cohesiveness, mobility, coating of paste on aggregate, bleeding tendencies, slump and unit weight of the concrete. This laboratory control mix is purposely lean and oversanded in order to exaggerate the air entrainment so that when the cement is used in the field, the air content will not be excessive.

This control test, developed prior to our first commercial run of air-entraining cement, has proved highly successful for determining the proper amount of air-entraining agent to be used with the cement from each of our plants. Field observations over a period of years show quite consistent results in concretes made with air-entraining cements from our several plants. Air contents of the fresh concrete ranged from 3 to 6 percent by volume with only isolated cases falling slightly over or under these limits.

Subsequently our laboratories developed, and for a period of time have used, a simpler test that can be made in the cement laboratory at any plant. This consists of a mortar test using standard Ottawa sand, the Burmister mortar flow trough, and the unit weight of the mortar, from which is calculated the percentage of entrained air. From this calculation is determined the precise amount of air-entraining agent to be added to a given cement to provide a predetermined amount of entrained air.

The results closely parallel those obtained with the concrete workability test, and a considerable volume of air-entraining cement made in accordance with this mortar air-entraining test at our several plants has proved uniformly satisfactory in the field. This method of test has been submitted to Committee C-1 of the American Society for Testing Materials, and is now being actively considered. It is believed that such a method of test will provide the desired control of air-entraining agent and achieve satisfactory uniformity in the amount of entrained air.

Entrained air reduces bleeding

A study of the reasons why entrained air improves various properties of concrete for paving also has been made. According to one school of thought, the theory of voids, segregation and bleeding, and their effect upon the durability of normal concrete and air-entrained concrete may be stated as follows:

In concrete made with normal cement, excess water often is used to impart workability. This causes segregation and bleeding. These are the twin ills of concrete, and where one exists the other also is present. The bleeding makes tiny channels to the surface and ponds under the aggregate. In addition, the water remaining in the concrete after the bleeding has taken place forms other channels in the cement paste. After the concrete has hardened, these tiny channels and ponds in the concrete and in the paste are areas where water can enter and freeze and where salts can crystallize. If the resulting expansion exceeds the tensile strength of the concrete, failure may occur, especially at such weak points as the surface, corners and edges. However, in the case of normal-cement concrete, when sufficient cement is used, and the aggregates are properly graded, and the mix is so designed on the job that bleed water in the concrete and retained water in the paste are kept at a minimum, the tensile strength of the concrete will be ample and the concrete will be durable.

How does concrete made with air-entraining cement differ from this? All portland cements contain small amounts of alkalies—compounds of sodium and potassium. When water is added to cement containing a small amount of air-entraining agent (animal fats, vegetable oils or resins), the alkalies in the cement are dissolved and combine with the air-entraining agent forming small amounts of soap. This soap also may be made beforehand and added at the grinding mills or at the concrete mixer. In this form the air-entraining agent is said to be saponified or neutralized.

The mixing action in the concrete mixer whips a small amount of air into the concrete. When an air-entraining agent is present in the mixture, the soap forms and the air becomes entrapped in uniformly distributed, microscopic air bubbles which repel each other and do not readily unite to form larger bubbles. Microscopic examination of the hardened concrete shows that the bubbles vary in size from about 1/100 to 1/1,000 of an inch. From this it is easy to calculate that they range in number up to many billions per cubic foot. These tiny bubbles, acting as highly efficient fine aggregates, permit a reduction of both sand and water, and improve durability by reducing or eliminating segregation and bleeding.

How durability is imparted

The billions of tiny air bubbles, which air-entraining cement creates in the concrete, act like ball bearings that hold apart the particles of fine and coarse aggregate. While the solid particles can roll freely on the bubbles, they cannot roll freely through or around the bubbles. This prevents the particles from settling or moving out of their relative positions. Thus the concrete is very plastic, less water is needed for a given workability, and segregation and bleeding are greatly reduced or eliminated.

Even if excess water is used there is less segregation and bleeding than with normal cement because of the action of the bubbles. Therefore there are few or no channels formed by segregation and bleeding, but only the tiny channels formed by the retained water in the cement paste. When water enters these, the expansion of freezing water or of crystallizing salts does no damage to the concrete partly because of the small volume of water relative to the surface of the channels, and partly because of the cushioning effect of the air in the tiny voids left by the bubbles. This not only fortifies paving concrete against the action of freezing and thawing weather but also against the expansive action of crystallizing salts used for de-icing purposes.

Necessary mix changes

When air-entraining cement is used, consideration must be given to the increased volume of concrete resulting from the bulking effect of the entrained air. The quantities of materials that produce one cubic yard of concrete when normal cement is used will produce more than a cubi yard when air-entraining cement i used. The excess varies with the proportions and the aggregates used an can best be determined by trial mixes. To say it another way, the yield pe bag of cement will be higher but th concrete will be correspondingly leaner and weaker for a given mi with air-entraining cement than fo the same mix with normal cement. However, since air-entraining cement makes concrete much more plastic, better workability than with normal cement can be obtained with less sand and less water. Thus when the mi is adjusted, primarily by reducing the sand and water content and by using the same amount of cement pe unit of volume of concrete, air-entraining cement will develop about the same strength as normal cement.

To impart suitable workability with normal cement, lean mixes require more sand and water than rich mixes. Accordingly the use of air-entraining cement permits a greater reduction in sand and water with lean than with rich mixes. For example, the use of air-entraining cement generally permits a reduction in sand content of about 3 to 6 percent of the total amount of aggregates. It also permits a reduction in water of about a gallon or more per sack with lean mixes, and of less than half a gallon per sack with rich mixes. Our tests show that with lean 4-sack concrete higher strengths generally are obtained, while with rich 7-sack concrete somewhat lower strengths are obtained with air-entraining cement than with normal cement on the basis of the same yield.

Strength versus durability

For years it has been believed by many that the durability of concrete varies with its strength. However, as shown in the foregoing, this is not necessarily true, especially for concrete subject to severe exposure. In any event, durability should not be sacrificed for strength. It should also be emphasized that with present-day cement it is possible to make concrete twice as strong as with the cement of 25 years ago; that allowable working stresses have not increased in the same degree; that many building codes still call for 2,000-lb. concrete at 28 days, whereas with air-entraining cement it is possible to secure this strength at 7 days.

rthermore, the loss or gain in
gth due to use of air-entraining
nt generally is less than the vari-
s ordinarily obtained in the lab-
ry and in the field with normal
rete. For example, in making
gth tests of normal-cement con-
, cylinders from the same lab-
ry batch may vary up to 10 per-
or more, and from a given field
h by as much as 20 to 40 percent
the average. The present tenta-
standard specification for ready-
d concrete of the ASTM recog-
this variation by providing that
strength test shall have an aver-
value less than 80 percent of the
ified strength." In the final re-
the loss of strength, if any, is less
ortant than the gain in durability
the improvement in other desir-
characteristics that the use of air-
aining cement has been shown to
ide.

Because of some reports that extended mixing times in transit-mix trucks cause excessive air-entrainment, we made laboratory tests to study this question. All concrete for these tests was in the proportion of 6 bags of cement per cubic yard, and was mixed in a revolving horizontal drum type mixer of nominal 1-sack capacity.

Mixing times of 5, 15, and 20 min. were used (a) with the mixer drum sealed tight, and (b) with the cover removed. Included in these tests were Types I and II portland cement, and high and low alkali portland cements, with dry and saponified entraining agents added in amounts precisely determined for proper performance in accordance with the control test previously mentioned.

Within the range covered in these laboratory tests we were unable to reproduce, with the mixer either sealed or open, the reported conditions of excessive air entrainment.

Tests also were made to show the relative effect of low temperatures and the use of calcium chloride in the concrete made with normal cement and with air-entraining cement. The tests showed that both concretes were affected in the same manner by low temperatures, that the use of calcium chloride in the mix increased the early strength of concrete with both cements, and that air-entrained concrete, with or without calcium chloride in the mix, had the same superiority over normal concrete in resistance to scaling.

In conclusion, experience shows that, compared with normal cement, air-entraining cement makes concrete that dumps, spreads, screeds and finishes more easily, and that is more cohesive, more workable, more uniform and more durable throughout.

Behavior of Flexible Steel Pipe Under Earth Loads

xperience has shown that flexible
l pipe under earth load in trenches
embankments cannot be designed
perly by using standard methods
ployed in the design of rigid pipe,
ording to Russell E. Barnard, ad-
ory engineer of the spiral welded
e department, American Rolling
l Co.

n a paper presented before a re-
t meeting of the American Water
rks Association, Mr. Barnard
inted out that underground pipe
uld be classified in three cate-
ries: (a) Rigid conduit whose
ss-sectional shape cannot be dis-
ted sufficiently to change its hori-
ntal or vertical dimensions more
n 0.1 percent without causing in-
rious cracks; (b) semi-rigid pipe
ose dimensions can be distorted
re than 0.1 percent but not more
n 3 percent; and (c) flexible con-
it whose dimensions can be dis-
rted more than 0.1 percent but
t more than 3 percent; and (c)
xible conduit whose dimensions can
distorted more than 3 percent with-
t causing injurious cracks. Plain or
inforced concrete pipe and burnt
y pipe are considered rigid, cast
on pipe is semi-rigid, and steel pipe
having either light or heavy walls is called flexible conduit.

Design of flexible conduit by the flexure or bending moment theory of analysis, similar to that commonly employed for designing cast iron pipe either in trenches or under fills, fails completely to explain the proven performance of flexible pipe under earth load. Typical of flexible type conduit are the conventional corrugated riveted culverts used under railroads and highways.

Results from tests

Extensive loading tests on flexible conduit conducted by Dean Anson Marston of Iowa State College, the American Railway Engineering Association, and the University of North Carolina, indicate that the load sustained on rigid pipe tends to concentrate at the top and bottom. Flexible conduit, on the other hand, deflects and distributes the load around its circumference, resulting in unit pressures at the top and bottom equal to one-third of the pressures on a rigid pipe under identical loading. The side pressures, however, are much greater.

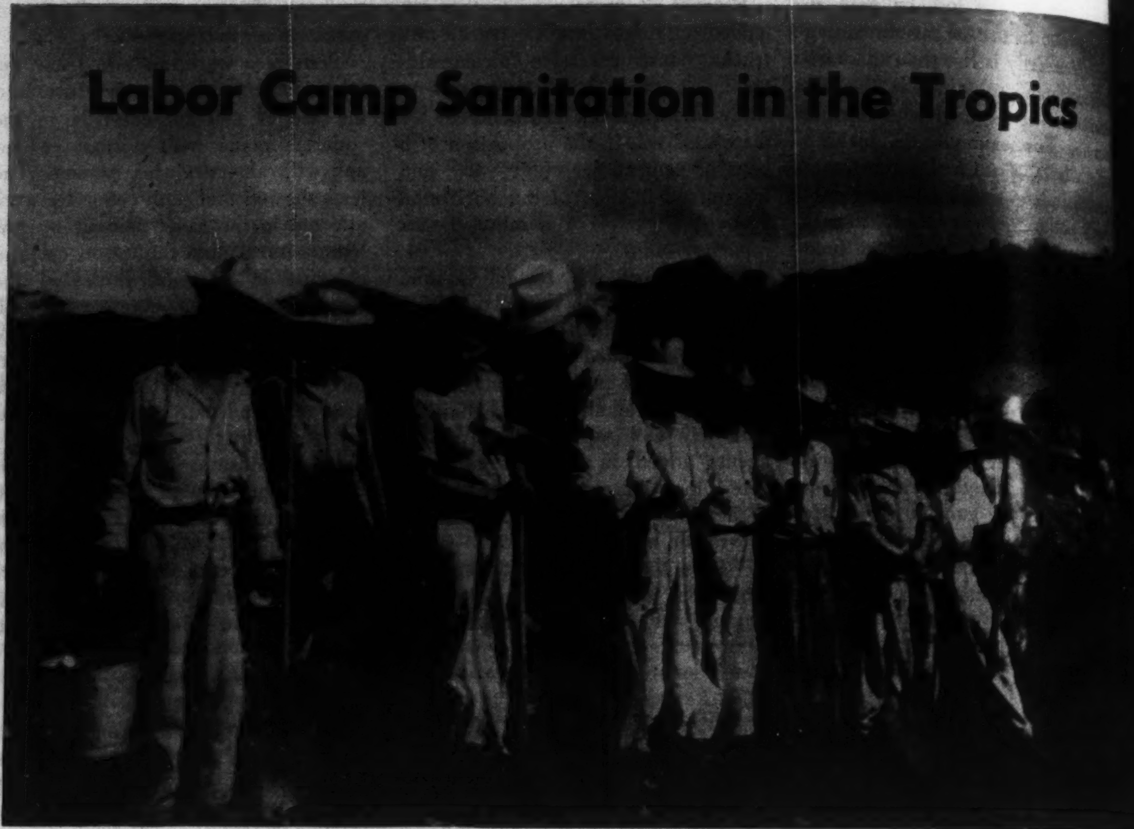
Although the maximum load-carrying capacity of flexible conduit depends to some extent on the wall thickness, it is able to make full use of the load-carrying ability of the earth surrounding it. Since this type of steel pipe may change shape without failure, it transfers part of the vertical load into a horizontal thrust which is resisted by the passive earth pressure at its sides as they move outward. If the wall were rigid such movement could not occur without failure.

Transfer of load

It follows then that rigid pipe must carry the entire superimposed earth load, whereas flexible conduit divides the load with the earth enclosing it. Therein lies the inherent difference between rigid and flexible behavior and the explanation why the bending-moment formula applies to the analysis of rigid pipe but not to flexible conduit.

On a basis of load consideration, a rigid pipe under a fill or embankment may carry a load greater than the prism weight directly over it by the amount of frictional force drag between prism and side earth, while a flexible conduit carries a load which is less than the same prism weight by an uplift amount dependent on a similar frictional force. With rigid pipe the frictional force is *additive* while with flexible conduit this force is *subtractive*.

Labor Camp Sanitation in the Tropics



C.I.A.A. photo

Fig. 1. Workmen are lined up to receive atabrine tablets for malaria control on a road construction job in Hondura

Health and Sanitation Division Staff
Office of the Coordinator of Inter-American Affairs
Washington, D. C.

Contents in Brief—On a road construction job in Honduras employing 1,700 native laborers, a camp sanitation and medical care program was provided at a cost of 29 cents per man per day. This amount covered all expenditures for housing, hospitals, kitchens, complete sanitary facilities, maintenance and policing, as well as medical care. An account is given of the measures employed, the type of facilities and the construction costs.

PROVIDING HEALTH PROTECTION and good living conditions for common laborers in isolated construction camps a form of insurance that pays dividends. How to provide such insurance at low cost is detailed in the following account, which is a summary of experiences on a road project sponsored by the Emergency Rehabilitation Division, Office of the Coordinator of Inter-American Affairs, in tropical Honduras.

On the construction of this 40 mi. highway between Potrerillos and Pito Solo (cost of which was $1,226,000) the medical and camp sanitation program was carried out by a field party of the Health and Sanitation Division of the Coordinator's office. Some 1,700 men were employed on this work for one year, distributed among 28 camps.

The entire cost of providing housing accommodations, kitchens, complete sanitary facilities, personnel for maintaining and policing the camps and complete medical care and hospitalization facilities was about $90,000. This averages 29 cents per man per day.

Experience along the Potrerillos road indicates the desirability of combining curative and preventive medical work under a single administration. Furthermore, it has been foun that each camp should have its ow medical and sanitary unit. The maximum personnel and sanitary facilitie desirable for a complete program in camp housing 200 to 400 laborer should be about as shown on the fo lowing page in Table I.

If severely injured or critically i patients are sent to hospitals in nearb communities, and if a traveling di pensary is used to make malaria mas blood surveys, the above personne and medical facilities can be reduced The hospital and laboratory may b eliminated and only a small dispensar provided to serve as headquarters o the sanitary inspectors and provide central location for emergency medical treatment and storage of drug and materials.

The medical aide would distribute atabrine and give emergency medica treatment. The sanitary inspector would carry out routine larvacidal operations, dispose of garbage, maintain all the sanitary facilities and assist i

g that health regulations were
rly followed. During the initial
ruction of a camp the builder
ld furnish the labor needed to
l the dispensary, the sanitary well,
privy, and the garbage pits and
en waste drains.

e health protection program
ld include, in order of impor-
: (1) malaria control, (2) med-
care, (3) general sanitation, and
mmunization.

Malaria control measures

e most important health measure
ted in connection with the con-
tion of the Potrerillos road was
compulsory use of prophylactic
rine for malaria control. All
kmen were required to take two
gram tablets of atabrine at one
on Tuesday and Friday of each
. In order to be sure that the ata-
e is not thrown away or kept to
ld, the workmen are lined up and
the required dose in the presence
medical aide who distributes the
rine and keeps a record of dos-
administered. Toxic reactions
this drug have been very few
since the protection afforded has
ome evident to the workmen they
e taken the medicine quite will-
ly.

n order to keep the number of
pheline (malaria-carrying) mos-
itoes in the camp areas at a mini-
m, sites were selected to avoid as
as possible proximity to anophe-
breeding waters. Mosquito pro-
tion is controlled by oiling all
nding water within a radius of
out ¾ of a mile. The oiling schedules
arranged so one or two men work-
continuously can spray each
eding area at least once a week.

None of the camp buildings other
n the dispensary and hospital is
eened. However, in some cases py-
hrum-kerosene mixture is sprayed
control adult mosquitoes in mess
ls and other places where workers
her in the evening. The job of
aying mess halls and other build-
is assigned as a regular duty of a
itary inspector. Specific results
m this work cannot be determined
t it is probable that the pyrethrum
aying is not a major factor in mal-
a control in these camps.

A small dispensary is provided at
h camp to serve as headquarters
medical and sanitary staff and to
vide facilities for care of the sick and injured. A laboratory and hospital were provided at each of two locations, serving the northern and southern sectors of the road. The dispensary and hospital buildings, of timber construction, are tightly screened and well lighted and ventilated. The hospital should have a capacity equal to about 3 percent of the camp population.

Water supply provisions

Either a shallow well or a surface stream provides the source of water at each camp. As originally used, these sources were subject to gross contamination. In Fig. 3 is shown an open top well which is unprotected from surface drainage and is subject to serious contamination by spilled or wasted water which falls back into the opening. Filth tracked onto the scant platform is certain to be washed back into this well.

The same well as reconstructed is also shown in Fig. 3. A ditch intercepts and carries away surface water. The pump is offset so that users do not have to stand on the well platform, and water spilled at the pump drains away from the well opening. A fence enclosure to keep animals away from the well and to prevent careless crossing or standing on the wooden platform would provide further protection.

In Fig. 4 (left) is shown the original source of water at another camp. This pool was probably used for drinking, bathing, and laundry on occasion. If used only as a source of drinking water, it was still subject to contamination by surface wash and by the feet of persons coming for water.

This source was replaced by the well shown in Fig. 4 (right); the well is beneath the box. The pump is offset 10 ft. and a drainage ditch and wire enclosure are provided. Wells should be located upstream from the camp and the latrines downstream.

The greatest single measure for protection against infection by the com-

TABLE I—PERSONNEL AND FACILITIES FOR A 200-400-MAN CAMP

Personnel

Physician	1 at	$200 per mo.
Medical aides	2 at	$65 " "
Male nurse	1 at	$45 " "
Hospital orderly...	1 at	$25 " "
Chief sanitary inspector	1 at	$45 " "
Sanitary inspectors.	2 at	$30 " "
Day laborers.......	2 at	$25 " "

Medical and Sanitary Facilities

Combination medical dispensary, laboratory and small hospital. Capacity of hospital should be at least 3 percent of camp population.

Oil spraying equipment for mosquito control within radius of ¾ mi. of camp.

Sanitary pit latrines.

Well or other protected source of water.

Garbage receptacles and disposal pits.

Kitchen and sink drainage pits.

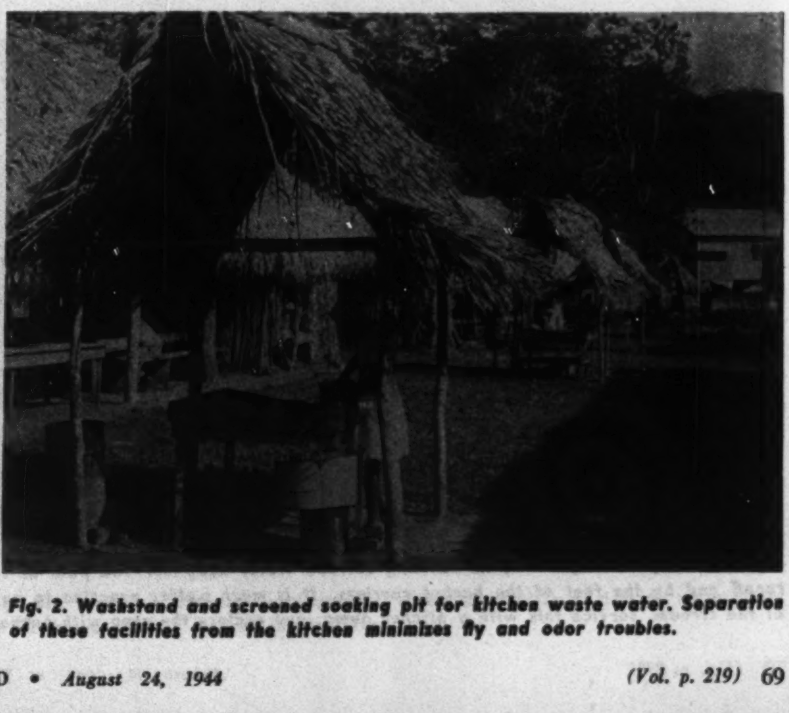


Fig. 2. Washstand and screened soaking pit for kitchen waste water. Separation of these facilities from the kitchen minimizes fly and odor troubles.

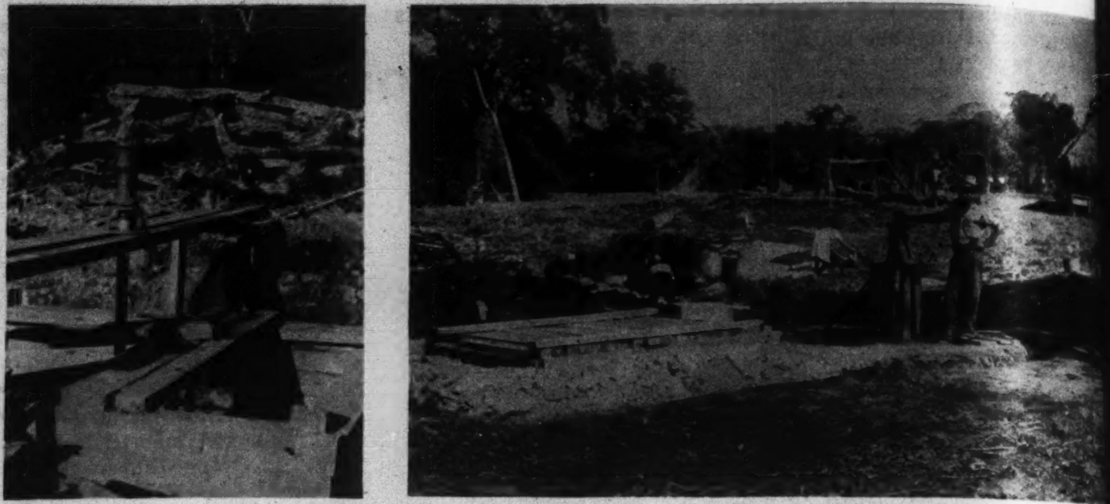


Fig. 3. Bad and good practice in shallow well construction. Failure to cover the well shown at the left invites poll of the supply from spilled water and from filth tracked onto the platform. This same well was reconstructed (at ri to provide a tight platform and drainage away from the well hole; note also that the pump is offset from the wel that spillage will not drain into the well hole.

mon intestinal parasites is the disposal of fecal matter beneath the ground. Sanitary latrines for this purpose are easy and cheap to build. Enforcing their use is more difficult. At first a few workers had to be jailed before they would conform. Furthermore, it was found necessary to station a sanitary inspector at latrines when they were first put in service to assure their being properly used.

A simple type of box latrine installation was used for camps along the Potrerillos road. These were located as conveniently as possible, but always downstream from the source of water. The pit is about 6 ft. deep, surface water drains away from the pit, and the box seat is as fly-tight as possible. One seat is provided for every 25 men. A sanitary inspector limes the pit contents daily as part of his regular routine.

Food sanitation facilities

Sanitation of kitchens consisted in providing better arranged open-sided buildings, with outside washstands, soaking pits for washwater, and ditch drains on all sides of the buildings. These measures were supplemented by daily inspection of the kitchens for general cleanliness. An app type of kitchen with outside w stands and proper drainage is sho in Fig. 5; the washstands at t kitchen are placed over the drain ditch.

This scheme was improved upon using soaking pits about 3 ft. squ and 5 ft. deep, filled with stone a covered with screen. The coarse fo solids caught on the screen are moved daily. A typical, washstand stallation with a screened soaking for kitchen waste water is shown Fig. 2. Separation of washing ope tions from the kitchen building

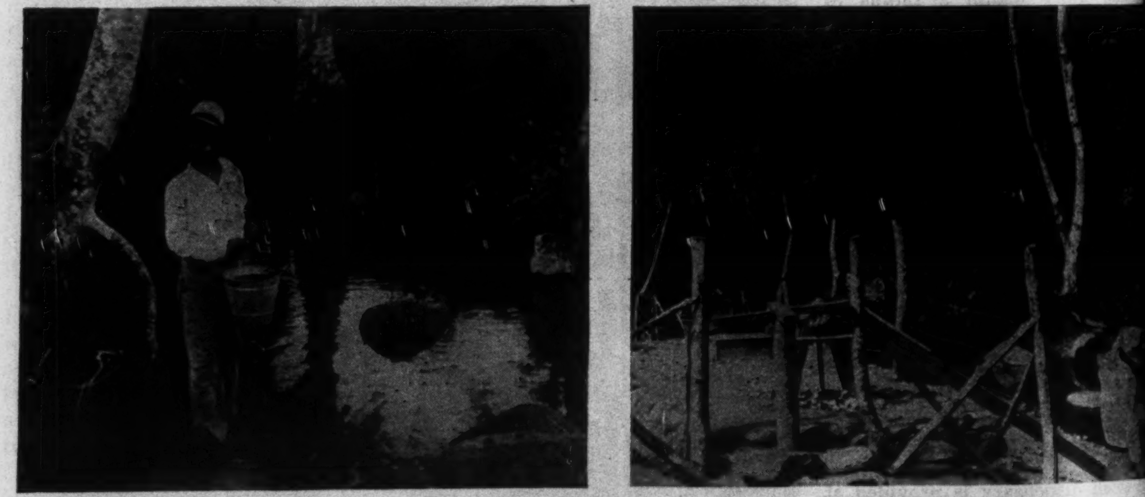


Fig. 4. Wrong and right way in handling surface water supplies. The pool at the left is subject to contamination fr runoff and by the feet of the bucket carriers. It is much better practice to put down a well a few feet from the ed of the stream, service this with a pitcher pump, and enclose the area with barbed wire.

d very satisfactory in reducing d odor difficulties. With this ar- ent, the drain around the n building serves only to re- rainwater.

bage is placed in fly-tight re- les and these are emptied daily. ge is disposed of in pits and daily accumulation is covered 3 in. of earth. When a pit is within 12 in. of the surface, its discontinued and the balance of ole filled with earth. Fig. 17 two pits which have been filled n open pit still in use.

xpensive but neat barracks were ded at each camp for housing rs. The barracks were inspected rly and the ground around them d for neatness. Thatched roofed cks, designed to house 72 men cost little more than unregulated unsanitary huts which are or- ily used.

Benefits and cost

e health work at the camps along Potrerillos road has probably re- d many times its cost in in- ed labor efficiency and reduced lost from incapacitating illnesses. education of laborers in cleanli- and care of health may prove to f greater value than the immedi- increase in efficiency of the con- tion program.

TABLE II—COMPILATION OF CONSTRUCTION AND OPERATING COSTS

28 barracks at $770 ea.	$21,560
41 kitchens at $100 ea.	4,100
6 wells at $10 ea.	60
17 garbage pits at $5 ea.	85
32 latrines at $15 ea.	480
40 cesspools at $5 ea.	200
Hospital	1,266
House for doctors	770
Miscellaneous (including water supply system and infirmary)	1,200
Total	$29,721
Costs of operating medical aspects of the program (excluding construction costs, but including wages for personnel used in sanitation and "policing" aspects of program)	$59,904
Approximate number of man days of labor Oct. 1942 through Oct. 1943	433,380
Cost per man day of labor for complete program (including housing, kitchens, in which food is prepared, sanitation facilities, complete medical and hospitalization care)	0.29

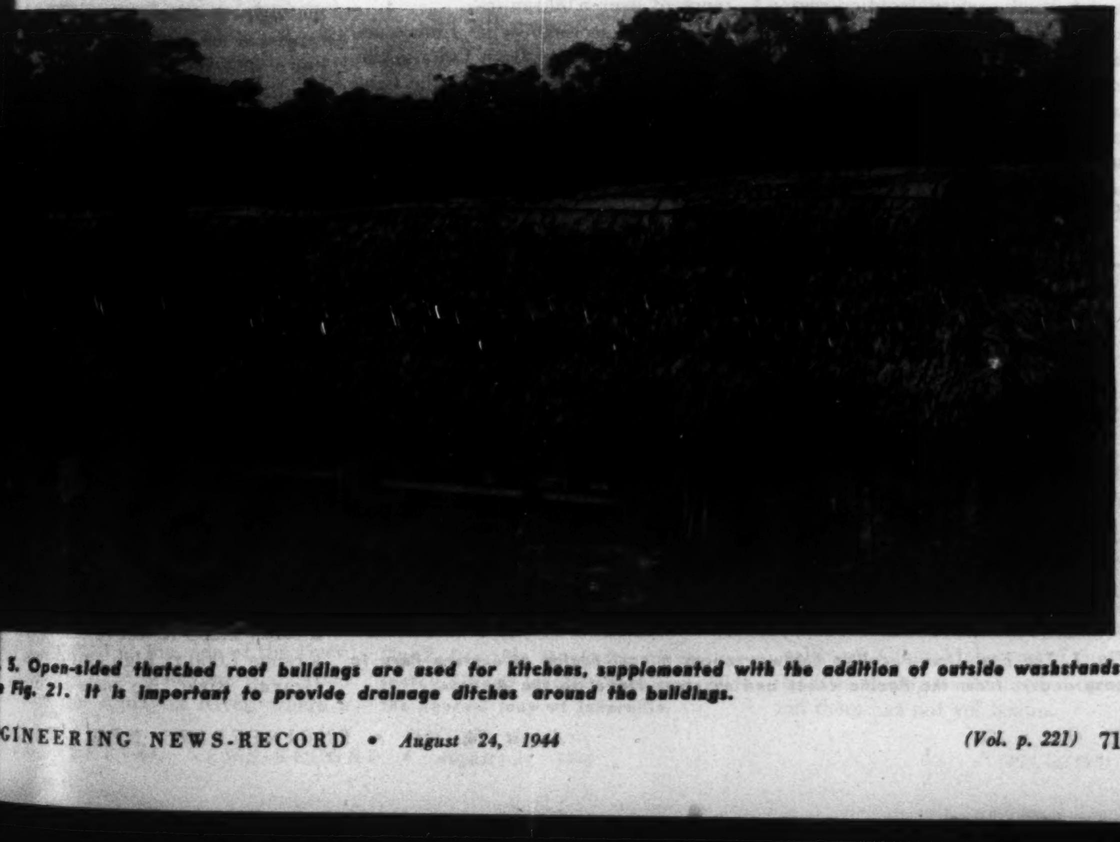
Construction and operating costs of the program are detailed above in Table II.

The total program cost was $89,625, or approximately 29 cents per day per man. This would appear to be very high, but it should be pointed out that included in the figures is the complete cost of providing: (a) housing accommodations for 2,800 men (100 men in each of the 28 barracks), (b) kitchens in which the food for these men could be prepared, (c) complete sanitary facilities (i.e., walls, garbage pits, latrines, and cesspools), (d) personnel for maintaining and "policing" the camps, (e) complete medical care and hospitalization facilities.

Furthermore, no consideration has been given to any salvage values derived from demolition of the various facilities in camps, as some camps were abandoned and other constructed further along the route of the road; nor was any value placed on the inventory of supplies and equipment on hand as of October 31, 1943, the last date used in the study by which the data presented were derived.

Direction of work

Health and sanitation activities in the Office of the Coordinator of Inter-American Affairs in Washington are under the direction of Col. A. R. Dreisbach, M. C., director of the division, and Lt. Col. H. B. Gotaas, Sn.C., assistant director and chief engineer. The field director in Honduras is Dr. I. F. Tullis, Jr., who is responsible for the medical phases of the program; engineering operations were conducted under the direction of Maj. P. C. Karalekas, Sn.C.



5. Open-sided thatched roof buildings are used for kitchens, supplemented with the addition of outside washstands Fig. 21. It is important to provide drainage ditches around the buildings.

Pacific to Amazon Highway

Major General Julian L. Schley
Director, Transportation Division
Office of Inter-American Affairs

Contents in Brief—*A daring piece of engineering, whose planning was aided by a missionary's diary nearly 200 years old, was necessary in constructing the new Lima-Pucallpa highway connecting the Pacific Ocean and the Amazon basin across Peru's towering Andes ranges. Climbing almost 16,000 ft. in the first 87 miles, then traversing the 13,000 ft. Andean plateau, the highway emerges into the tropical Amazon jungle through a canyon 6,000 ft. deep to constitute an important strategic auxiliary to the Pan American Highway system.*

AN OUTSTANDING wartime accomplishment of the Republic of Peru and an important contribution to the Allied war effort is the completion of the strategic Ocean-to-Amazon highway that now connects Peru's Pacific-Coast ports with the upper Amazon valley. This valley is today the Western Hemisphere's source of natural rubber, quinine and other strategic materials.

"The completion of the Lima-Pucallpa highway uniting Lima, the capital of Peru, with Iquitos, the capital of our great eastern frontier region, thereby closing the final link in the chain of land and water communication between the Atlantic and the Pacific oceans, marks an historic epoch in the economic development of our nation and of the entire Amazon Valley," said Manuel Prado, president of Peru, at the recent official opening of this important highway link.

The trip from Lima to Iquitos now takes only five days—two by motor car on this highway and three by river steamer—and costs about $17. Previous to the completion of this 522-mile highway, the 30-day overland trip by mule and by canoe between these two cities was so arduous that many travelers preferred to go the long way round by steamer—up to the Panama Canal, around northern South America to the mouth of the Amazon and up the Amazon to Iquitos, a total distance of over 5,000 miles.

The first section of the Lima-Pucallpa Highway, that from Lima to the central plateau, is known as the Central Highway and has been completed for several years. It has an asphalt surface for 116 miles, or as far as Oroya.

This Central Highway is one of the most daring pieces of highway eng neering in the world, for, in the fir 87 miles of its length, it clim through a series of canyons, unbelie ably narrow and steep, and cross the Anticona Pass at almost 16,000 above sea level. At one point the ro crosses itself twice by bridge in great climbing figure-8 loop, the on loop of this kind in America (s insert, Fig. 2).

From the top of the pass the ro continues at an average elevation over 13,000 ft. until Cerro de Pasco passed. It then dips into and out of series of lower valleys.

An over-night stop is usually ma at the picturesque town of Huanuc 260 miles from Lima and 6,600 above sea level. Here the governme has built a modern hotel with accom modations for 62 guests.

Descends to tropical valley

Continuing eastward from Huanuc the highway crosses some of the lesse ranges of the eastern Andes and drop down into the tropical valley of th Huallaga River to the frontier town o Tingo Maria, which a few years ag was only a collection of thatched hu marking the end of the trail. Today is on its way to becoming an impo tant town boasting of a new hotel wi accommodations for 48 guests, a ne and up-to-date tropical hospital wi 40 beds, a government agricultur experiment station whose buildin cost $160,000, quarters for vario government officials and administr tive officers, a modern school, tw sawmills, warehouses and stores, an an active traffic on the Huallaga Rive

Beyond Tingo Maria the highwa almost loses itself in the heavily for ested ridges of the Blue Mountain Here enters one of the most romant episodes in its construction.

The problem was to get out a valley 2,200 ft. above sea level, ov a range 7,000 ft. high and down to th Ucayali River. No pass through th

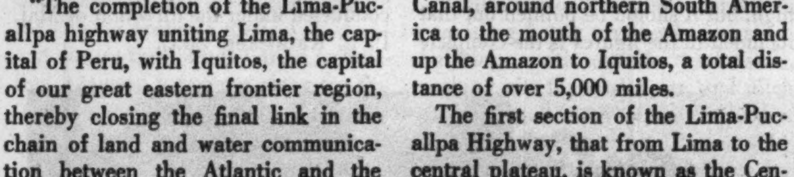


Fig. 1. The new Lima-Pucallpa highway opens a vast region of eastern Peru to easy access from the Pacific coast and shortens travel to the Amazon.

mountains could be found. Someone then remembered that, in past centuries, the Franciscan missionaries had explored much of this country in their efforts to convert the Indians. How did they get through? The engineers delved into dusty church archives in Lima where they studied old diaries and musty, faded field notes of those hardy brown-robed men who were explorers as well as missionaries.

Then, in the spring of 1937, Frederico Basadre, one of the engineers, found the long-forgotten records of the Franciscan missionary Fra Alonso Abad, which covered twelve closely written manuscript volumes. Here was a record of a long and exhausting search through the dark and uninhabited jungle for a break in the Blue Range and a way through to the Amazon—but let the record speak for itself:

"In the spring of 1757," says this old diary, "we organized a new expedition, leaving the Indian village of Cuchero on May 4 with 17 Indians and arriving on May 15 at Tulumay, and, following the directions of a previous expedition, we discovered, on the 25th day of May the 'Paraja' where a passage seemed to open in the broken country which led to a gorge or canyon leading in the direction of the forest-covered Pampas of Sacramento (or Amazon lowlands)." The reader must remember that this little band was groping its way through an almost impenetrable tropical jungle.

Rediscovers canyon

On July 22, 1937, Mr. Basadre, following the exact directions written nearly 200 years before, found the same canyon which the Yuracyacu River had cut in an easterly direction through the Blue Range. No other person had been through this gorge in nearly two centuries, for this part of Peru is uninhabited. This canyon, which has been named after Padre Abad, is a deep, narrow transverse crack through this range, brought about by some gigantic seismic disturbance of the past. This crack is a little less than 3 miles long, not over 300 ft. wide in places, and 6,000 ft. deep. The bed of the gorge is 1,400 ft. above sea level. Three tunnels and three bridges were required to get the road through at the side of the river.

Leaving the canyon, the road crosses the Aguaytia River, where a bridge 2,560 ft. long is yet to be installed. The crossing is now effected by a ferry, and the road continues across the forested virtually uninhabited lowlands to Pucallpa on the Ucayali River, a tributary of the Amazon.

Pucallpa, only a frontier village five years ago, now bids fair to become the metropolis of eastern Peru. It already has an airport, a hospital, a school, and other modern buildings. River steamers towing barges now ply between Pucallpa and Iquitos, to which point ocean steamers up to 6,000 tons come 2,300 miles up the Amazon from the Atlantic.

A new fast route

The opening of this new route is of great strategic importance, apart from its economic value. It is already described as a vital auxiliary of the Pan American Highway system.

A regular overland mail and parcel-post service between Lima and Iquitos has been established. The first mail truck left Lima on the morning of Sept. 8, 1943, and made the 522-mile run to Pucallpa in 14 hr. and 20 min. or an average of over 37 mph.

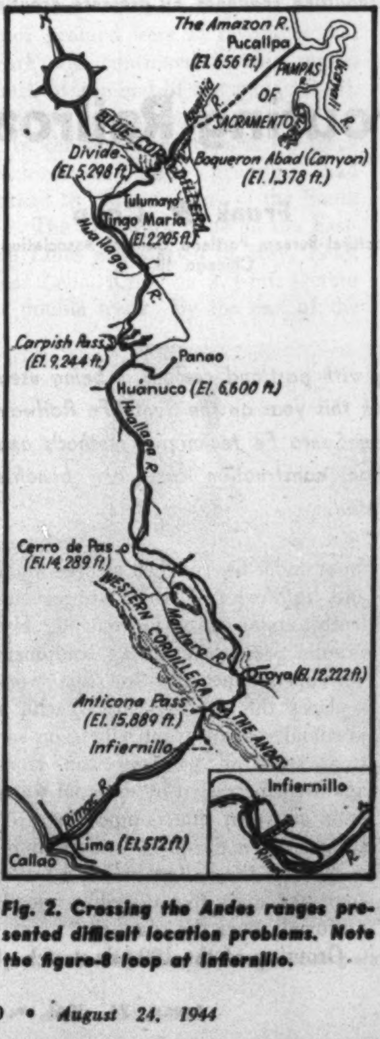


Fig. 2. Crossing the Andes ranges presented difficult location problems. Note the figure-8 loop at Infiernillo.

At Pucallpa the mail is placed on board a river steamer for the 3-day, 650-mile run to Iquitos. Passenger buses make the run between Lima and Pucallpa in two days with an overnight stop at Huanuco. A transportation company has been organized to handle shipments of merchandise between Lima and Iquitos.

The wartime completion of this highway, which was begun several years ago, is credited to the driving force of Don Carlos Moreyra y Paz Soldano, Peru's dynamic Minister of Public Works and Development, who has made this task a No. 1 objective of his administration.

Resources of the region

This Amazon valley region is rich in rubber. With the aid of United States credits, there has been established a Peruvian Amazon Corp., which will develop other tropical products of strategic importance, such as quinine, jute and cocoa.

A most significant phase in the development of this new region was the discovery of oil, some six years ago, at a point about 50 miles upstream from Pucallpa on the Pachitea River and only about 20 miles from the line of the present new highway. So far as is known, this is the only dependable supply of petroleum in the Amazon valley.

A small topping plant has been installed here at the Blue Goose wells and is now supplying gasoline and oil at the rate of 2,000 barrels a month for the river transport from the upper Amazon valley to the city of Iquitos and to nearby Brazil.

Highways of penetration

The "highways of penetration," aimed to connect Peru's coastal and plateau regions with the Oriente, or the Amazonian Basin, are: (1) the Pucallpa Highway just described, (2) the Olmus-Maranon Highway in the north, now well under way, (3) the Urcos-Marcopata-Madre de Dios Highway, and (4) the Huambutico-Paucartambo-Madre de Dios Highway. The last two are in the Department of Madre de Dios and branch off to the east from the two named stations on the Cuzco-Puno railroad. Other highways of penetration are being considered, but work on them has not yet begun.

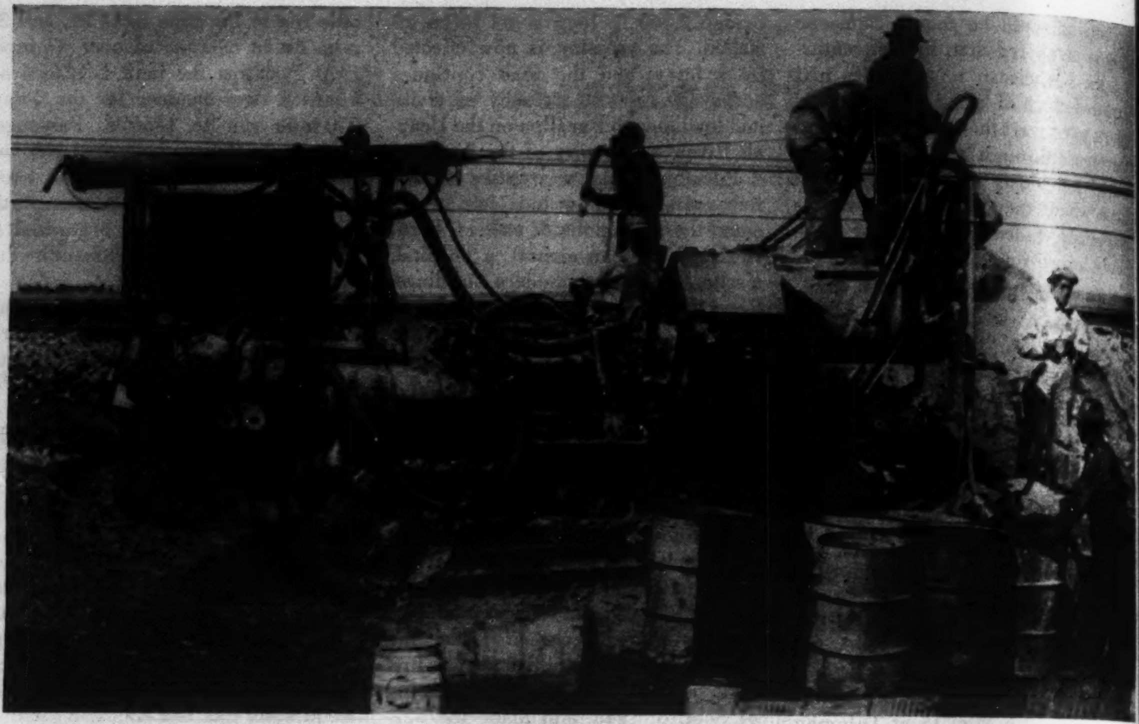


Fig. 1. Tractor-mounted equipment for stabilizing roadbeds by pressure grouting was improvised by Santa Fe engineers.

Pressure Grouting Railroad Roadbeds

Frank W. Capp
Structural Bureau, Portland Cement Association
Chicago, Ill.

***Contents in Brief**—Pressure grouting with portland cement is being used to stabilize 100 miles of main line track this year on the Santa Fe Railway system in Kansas. Development of the Santa Fe technique, methods and equipment employed, gang organization, construction costs and benefits of pressure grouting are discussed in detail.*

STABILIZATION of railroad roadbed by pressure grouting with portland cement has met with such success on the Santa Fe Railway during the past two years that the company is grouting 100 mi. of troublesome roadbed this year between Emporia and Holliday, Kans. The technique involved is not designed to form a structural subballast concrete slab, but rather it is to stabilize the existing supporting material.

The chief objective of pressure grouting, according to theories of the Santa Fe engineers, is to force out from under the roadbed all free water and liquified soil which surges violently under train movements. Hydraulic pressure grouting equipment developed especially for this work replaces the expelled liquid with a portland cement grout which, on setting, seals all passages and voids against penetration by external water from above or that pumped up from below. When the grout stiffens it incorporates the ballast and soil into a cemented mass that distributes loads uniformly over the roadbed.

Grouting of the 100-mi. stretch of roadbed is being performed simultaneously by ten grouting outfits. Seven are commercial units and three are units improvised by the Santa Fe during their investigations of the effectiveness of the method during the past two years. All ten grouting gangs started work near one end of the project, spaced at $\frac{1}{4}$-mi. intervals. Work proceeds in one direction with each gang completing its assignment to connect with that of the adjacent unit. They then advance by leapfrogging around treated sections to the next assignment.

A schedule has been set up calling for an average grouting rate of 440 track feet per day per unit, or $\frac{3}{4}$-mi. for the 10 gangs. After the roadbed is grouted, all ballast is removed to 8 in. below bottom of ties and replaced with chat ballast. The present

2. Originally designed for charging the grout mixer by hand (left) commercial units were improved to include a rging hopper and premixer (right).

-lb. rail is being replaced with 131-lb. rail throughout the 100- of track improvement.

To continue studies

Several improvements in grouting nique are expected to result from e elaborate setup established for this ge project which contains all kinds track conditions. Maintenance dies and the observation of train vements over such a long section treated track will provide an oppor- nity to establish the full value of ck grouting.

Another benefit will be the training a number of foremen and key labor ngs which may serve as nuclei for ck grouting units throughout the nte Fe system.

Pressure grouting on the Santa Fe ilway dates back to December, 41, when attempts were first made stablize two 200-ft. long water ckets on a section of roadbed near aton, Texas. Pneumatic equipment s improvised and techniques em- oyed on pioneer pressure grouting rk were followed. Air pressures up 100 psi. were used and experiments re made with a variety of grout ixtures.

Hydraulic method is preferred

Although this pneumatic method et with some success Santa Fe engi- eers became convinced that they uld obtain better results by using draulic pressure for injecting the out. Accordingly, a home-made draulic grouting outfit was impro- sed from equipment normally avail- le in track maintenance. It was en a field trial, and subsequently echanical changes were made from time to time to improve its operation.

Working technique, accessories, number and distribution of men in the grouting gang, and other factors were given careful attention. Studies of grout mixtures, hydraulic pressure, type and spacing of injection points proceeded simultaneously.

Initial reports on the riding characteristics of the small sections of track grouted were so favorable that work was continued in this region until, by the end of last year, 30 mi. of track were grouted.

In the meantime reports on track performance after grouting had spread to other regions of the Santa Fe. The first work done on the Eastern Lines was started in May, 1943, near Lebo, Kans. on a ½-mi. section of double track. By the end of the year 5 mi. of track had been stabilized in this district.

Successful results obtained with these two improvised units under widely varying track conditions demonstrated the possibility of pressure grouting for track stabilization so thoroughly that Santa Fe officials considered the time ripe for development of equipment capable of more efficient and rapid grouting.

Commercial units developed

At this time the Koehring Company of Milwaukee became interested in developing such equipment for commercial sale, and dispatched representatives to study equipment and techniques developed by Santa Fe.

As a result, a standard hydraulic pressure mud jack was modified by

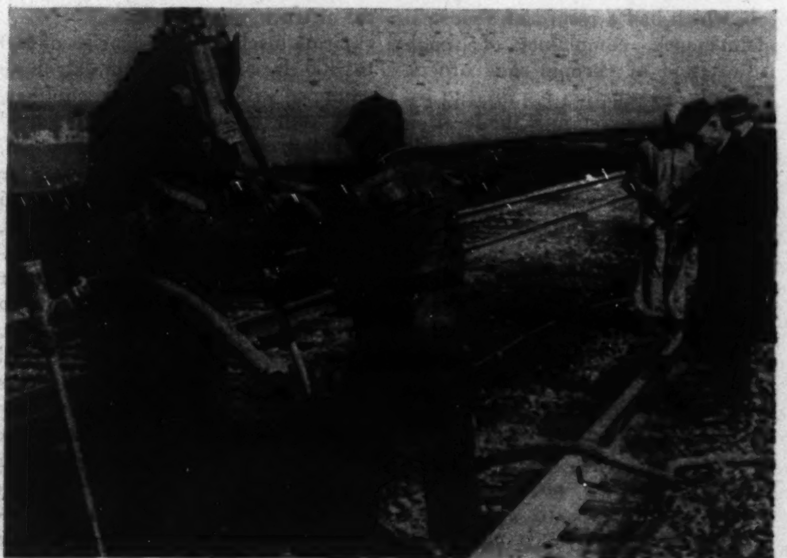


Fig. 3. Grout-injection points and bull points are driven by an air hammer.

Fig. 4. Bull points (left) and short injection points are pulled with pinch plate and claw bar. For longer injection poin (right) a pole and chain works well.

Koehring and given a preliminary trial on pressure grouting of a track near Edgerton, Kans. It was returned to the shops to correct certain mechanical difficulties and to adapt it more closely to track grouting work. Results were so promising that a second unit was rebuilt, introducing additional modifications which further improved grouting operations. Seven of these units are being used on the 100-mi. stretch of Santa Fe track.

Santa Fe's grouting technique

A clear picture of the Santa Fe technique of pressure grouting is best illustrated in the following description of equipment, gang organization and operations on a typical job, which had a record of abnormal maintenance, complaints of rough riding, and of chronic slow orders. The only information required to begin grouting operation is the location and length of track to be treated and a description by the section foreman of the spots giving the most trouble.

An accurate subsurface survey is provided automatically by the changing resistance to penetration encountered as injection points are driven through various roadbed materials. Under-track conditions are far from uniform and the quantity of grout that can be injected at any location varies between wide limits. Grouting materials, therefore, are ordered on average quantities required under similar conditions.

Grouting equipment is carried to the job on a flat car, and tools and spare parts in a tool car. Labor gangs sleep and board in camp cars. Initial cars of sand and cement arrive with the camp and equipment, and other cars follow as required.

Water supply, frequently a difficult problem, is settled before starting the job. In arid locations water may be delivered by truck or train to portable tanks for job storage.

Tractor-mounted equipment

Large equipment includes either a tractor or 4-wheel drive truck with power take-off, a two stage compressor, and a grout mixer and pump including a charging hopper with hoisting device. The mixer, pump, batching and hoisting apparatus are mounted together directly on the tractor or truck, or on a trailer.

Grout discharge line consists of 100 to 300 ft. of 5-ply, 1¼-in. air hose equipped with quick-acting couplings, and with a standard "glad hand" train line coupling at the delivery end.

Equipment for driving holes for grout-injection points include 3 to 6 bull points about 5 ft. long, claw bars, track jacks with base notched to provide a more effective uplift, and air hammers. Air hammers have 200 to 300 ft. of ¾-in. air hose and couplings. Grouting points of 1⅜-in. I. D. steel tubing are provided in various lengths up to 10 ft.

A 500- to 1,000-gal. tank truck equipped with a small self priming centrifugal pump capable of delivering 700 gal. per hour is used in addition to two 600-gal. stock tanks for job storage.

A large, powerful motor car and two push cars or trailers transpor the gang, cement and tools fro camp to job, and a small inspectio motor car is provided for the machin operator to go to and from the jo independently.

Sand is dumped on the subgrad shoulders in half-carload piles, space according to the estimated amount o grout required. Water tanks an cement are spotted near the sand pile and grouting equipment is positione where sand and cement can b batched easily into the charging hopper.

Typical grouting gang

A typical grouting gang employ one foreman, a machine operator, on truck operator and from 7 to 20 trac laborers. Considerable thought ha been given to organization and th sequence of grouting operations i the interest of speed and economy o performing the work.

The machine operator directs th placing of equipment. He starts u the equipment before the gang arrives each morning and keeps it lubricated and serviced throughout th day. He also operates the grout pump and usually has a helper. After wor stops at night they clean the equipment and make minor repairs. Th small overtime expense of the machin operator and his helper is well justified by the avoidance of equipmen breakdowns which would delay th entire gang.

Two or three men service the wate supply line and place sand and cement in the batching hopper. Tw n on top of the mixer look after terials there.

Bull points are driven and excted by two or three men using hammers and mechanical pullers. is is followed by a crew of from to four men who insert the groutection points, couple and uncouple grout discharge line, extract intion points from holes after grout, and move forward to new holes. For efficient operation, two to four ection points are kept ahead ready coupling to the grout line. By tinuous practice the men become perts in handling the hose and uplings. In fact, with a little exrience, they uncouple, move ahead d couple up to a new point without pping the grout pump, thus saving nsiderable time.

Where two pumps are used from e outfit with two hose lines a separate crew operates each line. Flagen are preferred to slow orders on ck being grouted.

Operational procedure

To start grouting operations, the ixing equipment is assembled, hose es laid and a few bull points driven d pulled. Several gallons of water e placed in the mixer and pumped to the grout hose. Next, the mixer charged and grout is pumped into e discharge lines forcing the water t. When the grout appears at the scharge coupling the hose is concted to the injection point which s been driven to proper depth while mping is in progress.

Proper depth for the tip of the jection point is at or near the botm of the track ballast which ordirily is in a soupy layer of soil susnded in water. Should the point e driven below the ballast into subade material which cannot be peneated freely, it is withdrawn until the rout is freely discharged. Pumping ntinues until the grout escapes om a nearby driven point or breaks t at some other place.

Injection points are spaced accordg to track conditions. They may reire spacing at every crib (20 in. art) or in some instances inserting em at every fourth crib (80 in. art) is sufficient to thoroughly abilize the roadbed. No rule is used r spacing the injection points, ther it depends on the skill and dgment of the foreman. In any ent they must be close enough together to insure the thorough penetration of all intervening material.

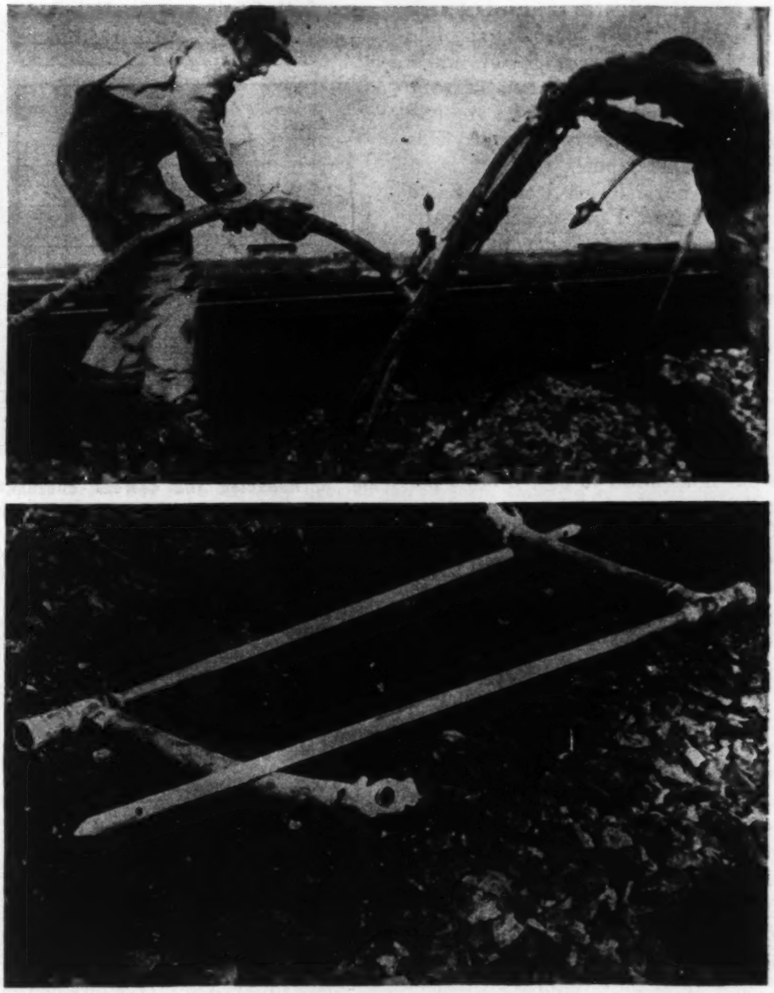


Fig. 5. As air hammer drives injection point a little deeper (top) a "glad-hand" coupling is made between strokes of the grout pump. Injection points (bottom) are simple, efficient and will take lots of abuse. Those shown are 5 ft. long below the wye.

Normal portland cement is used in the grout. No advantage results from the use of special cements since any suitable grout is necessarily grossly over-watered. Reasonably clean water is used but a small amount of silt or sand in it is not objectionable.

Sand must be fine-graded

Characteristics of the sand, however, are of the utmost importance. It must be quite fine in order to pump properly and to permeate the small passages and fine material in the roadbed. The sand is screened before delivery and protected at the job from becoming mixed with foreign materials until used.

Illustrative of the fineness of sand required to do a good job is the following grading for a typical Santa Fe job: 90 percent passing a 50-mesh sieve; 65 percent passing a 65-mesh; and 10 to 15 percent passing a 100-mesh sieve.

A small amount of silt and clay actually adds to the ease of handling the grout. Because of the fine graded sand, grout of suitable consistency is obtained with comparatively small amounts of portland cement and large amounts of water.

In general, the grout is mixed by using a volume of water equal to the volume of the cement plus the sand. Thus, for a grout composed of 1 sack portland cement to 6 cu. ft. of sand (damp loose) the water amounts to 7 cu. ft. or 52½ gal.

For computing the yield of grout

the following figures are used: 1 sack of cement (0.49 cu. ft. absolute volume) plus 1 cu. ft. of water yields 1.5 cu. ft. of grout. Also 1 cu. ft. of sand (0.58 cu. ft. absolute volume) plus 1 cu. ft. of water yields 1.6 cu. ft. of grout.

Mixes normally used on the Santa Fe range from 1 part cement, 6 parts sand and 7 parts water to 1 part cement, 8 parts sand and 9 parts water.

Material costs

In computing the cost of grouting, cement is taken at 50 cents per sack, sand at 3 cents per cu. ft. and water at 4 cents per cu. ft. Injecting the grout is assumed to cost 2 cents per gallon regardless of its composition. Thus, a mixture of 1 sack of cement, 6 cu. ft. of sand and 7 cu. ft. of water yields 11.1 cu. ft. or 83.3 gal. of grout for 96 cents. This represents a cost of 1.15 cents per gallon for the materials in the grout.

Although the amount of sand plus cement required in grouting some 22 mi. of Sante Fe track ran from 0.5 to 15 cu. ft. per track foot, the average volume was 1.5 cu. ft. which represented 2.25 cu. ft. or 17 gal. of grout costing 3 cents per gallon in place. Since the cement costs about 10 cents per track foot or 20 percent of the total cost, it is evident that the amount of cement used does not greatly affect the overall cost. Somewhat greater stability, however, is believed to accompany the richer grouts.

The cost per track foot for a single day's work has ranged from $0.15 to $2.00 with an overall average for 22 mi. of $0.42 per foot of track. This cost includes all items except general supervision, interest and rental of equipment.

Records on one grouting unit over a 16-mo. period disclose that from 40 to 1,170 track feet were treated in a 10-hr. day. The average rate of progress, however, was 300 ft. per day.

Some observations on grouting

A wide range of track conditions have been benefited on the Santa Fe by pressure grouting. Fills, cuts, side hills, single and double track are all subject to the formation of water pockets. A recognition of their many common characteristics explains why injecting cement grout secures beneficial results.

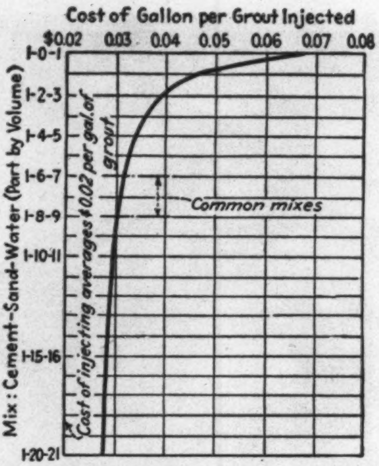


Fig. 6. Reducing the cement content of the grout below 1 part cement to 5 parts sand has little effect on the cost of the injected grout.

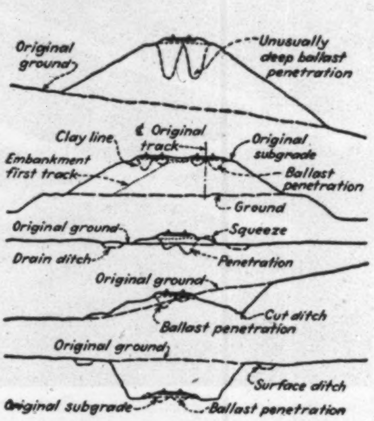


Fig. 7. Typical cross-sections of actual job conditions encountered indicate the unpredictable form of the roadbed water pockets before grouting.

When water-bearing suspended soil is pumped up under train traffic from the subgrade into the track ballast, the fine material is deposited, and this, together with droppings from cars and dirt deposited by wind, fouls the ballast to a great degree.

Usually a layer of this dirt is formed in the top ballast, extending well below the tie bed as a caked, impervious material when dry. But when wet it is plastic and mushy. Below this tight upper layer the ballast usually is more pervious. At the bottom of the ballast section and just above the clay line, the material is washed clean by the water when agitated by train movements.

This lower zone of water-bearing clean ballast is the most active zone in the destructive process. Removal of this water is a vital consideration. With the injection point driven to the bottom of the ballast just above the clay line, this liquid material is readily displaced by the grout. The grout fills all passages where water has been active, following weak seams and fingering up into fissures or openings in the material directly above it.

Distribution of the grout is aided by the comparatively impervious top ballast layer. It also prevents the escaping of much grout into the top ballast. Occasional cementing of the top ballast is of little concern since the cemented patches can be broken up with track tools. Improvement of track conditions is noticeable immediately upon grouting and it continues to improve for some time until the subgrade reaches a normal stabilized condition.

Performance of treated track under severe climatic conditions and main-line traffic is the real test of grouting. Detailed reports covering more than a year's service on a considerable mileage of grouted track on the Santa Fe show treated sections have improved considerably in appearance and riding characteristics. On every such stretch a marked saving in track maintenance has followed, ranging from 30 to 82 percent.

Typical grouting project

Typical benefits of roadbed stabilization by pressure grouting are disclosed in the track records on the Thatcher line change between Delhi and Simpson, Colo. Constructed through adobe country during dry weather in 1936, the non-compacted subgrade of this line change was immediately ballasted. Water pockets developed at once in both cuts and fills and the roadbed became progressively softer. By 1939 nearly its entire length contained water pockets and, strangely enough, fills developed much worse conditions than the cuts.

Various stabilization measures were tried during 1940-41 but with little success. Drainage by several methods resulted in slight improvement. Screening walls constructed in cuts and screening blankets covering the entire width of fills improved the track considerably but did not get rid of all the free water under the ck. Trains operated under a re-icted 40 m.p.h. speed except when tening of the subgrade during vy rains required further speed uction.

Operational speed reached a recl low of 5 m.p.h. at some locations ring the early spring of 1942.

Built on adobe subgrade

The character of subgrade matels were largely responsible for the ditions just described. The soil Apishaba shale which, on disinteating, becomes adobe. It is not bject to sheet erosion but forms rtical walls when cut by water. On ying, numerous vertical cracks rm, but no horizontal ones. It comes almost greasy when wet, and ck that is supported on it, espelly on curves, is difficult to hold in e.

Continued drying widens the surce cracks and makes the surface wdery, but the core remains filled th water and is soft and plastic. is dried surface furnishes some eral support to the interior but ring rains it softens and water ens the cracks to add to that already ld internally.

A severe grouting test

Faced with the severest of tests on essure grouting, one of the Santa 's homemade grouting units moved on the job early in 1942. Within ½ months a volume of grout conining 31,500 cu. ft. of dry materials s injected under 22,100 ft. of track a cost of $0.53 per track foot.

Improvement was noted at once. hen grouting commenced a 40-p.h. speed restriction was in effect er most of the 16 mi. of track. pon completion of the grouting, eed restrictions were raised to 60 p.h., and ever since then speeds 60 to 70 m.p.h. have been peritted regardless of weather except three occasions.

On these three occasions, following 3-in. rain in August, 1942; three ys and nights of heavy rain the llowing October and a record rain short duration in August, 1943, erating officials familiar with the tory of the track placed precaunary restrictions on train speeds. ey were lifted within 24 hours, wever, after a check-up revealed t none of the track needed any ecial attention.

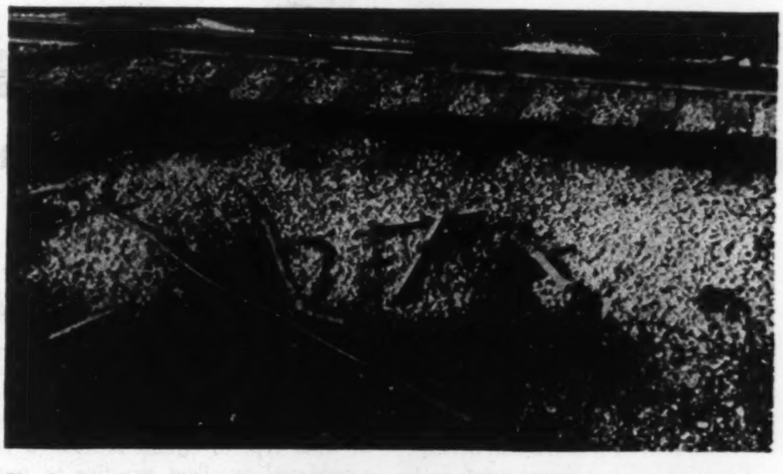


Fig. 8. Grout has followed clay lines to the surface, escaping at ballast line, to indicate the roadbed is fully grouted.

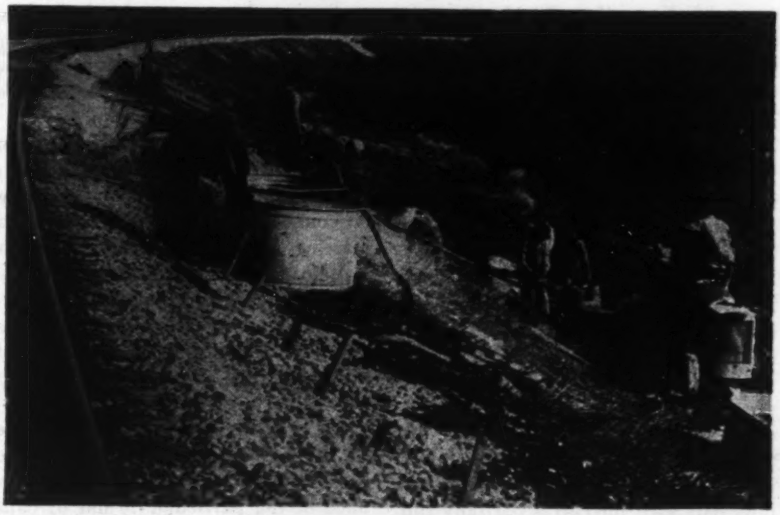


Fig. 9. Wooden stakes are kept in spud-made holes ready for injection points. Men in far background are injecting grout.

During July and August 1942 four heavy, soaking rains each caused considerable damage to an adjacent section of blanketed track which had not been grouted. But no damage was done to the grouted roadbed.

Many benefits accrue

There also are several other benefits from this treatment: track is kept in better condition with less labor; it looks and rides well, and no swinging ties are apparent at any point; surface bending of rails, which makes the joints hard to hold, is largely eliminated; the life of ties is lengthened due to less tendency for churning action of ties forcing water into splits and similar defects; and derailments caused by the unexpected development of soft spots under tracks are eliminated.

Development of pressure grouting methods used on the Santa Fe lines was under the supervision of T. A. Blair, chief engineer of Western Lines at the beginning of the program and now assistant chief engineer of the system. John R. Rushmer, engineering assistant, gave much of his time and efforts to the development and perfection of the grouting technique.

John Poulter, research engineer of the Koehring Company was instrumental in developing the seven commercial grouting units being employed on the 100-mi. stretch of Santa Fe track to be grouted this year.

Efficient Use of a Galvanometer On Blasting Operations

Paul C. Ziemke,
Oak Ridge, Tenn.

Greater efficiency in the use of a galvanometer on blasting work is possible by following a few simple rules, which will also result in a longer useful life of the instrument. In addition, fewer accidents will occur.

Function of a galvanometer is to enable the blaster to determine when the blasting circuit is closed or open and to indicate if a closed circuit is in the best condition for the application of the firing current. The galvanometer is also used to test each individual detonator prior to making up the primer cartridge, which eliminates those detonators that would cause trouble later.

A galvanometer should always be checked before it is used. This may be done by short circuiting the binding posts of the instrument by means of a knife blade or small metal bar to note if the needle will swing all the way across the dial. When the needle does not move, it is evident that the silver chloride cell that supplies the power is exhausted or that the tool is in need of repair. If the needle moves only part way, the cell is partially run down and will require replacement.

To renew the cell it is not necessary to send the instrument back to the manufacturer, but in installing a new cell care should be exercised that the wires are attached to the correct posts to maintain the proper polarity. Also, all connections must be properly tightened so that no high resistance contacts are developed and to eliminate broken connections by rough use in the field. Under no circumstances should other than the silver chloride cells be used, as this cell is the only type pronounced safe for blasting work. The silver chloride cell has the desirable characteristic of giving practically full voltage during its entire life.

The individual blasting caps may be tested by removing their shunts and applying the ends of the leg wires to the binding posts. A closed circuit in the cap (or detonator) will cause the needle to move across the dial, while a defective cap will cause no deflection, since no current can flow through its bridge wire. Regardless of what type of circuit is used, it is considered excellent practice to test each loaded drill hole prior to making up the blasting circuit. This work reveals any damage to the leg wires through improper use of the charging or tamping device. Corrections can then be made in due time before the work of connecting is begun.

When all the loaded holes have been checked for continuity of circuit and found satisfactory, they may be connected in parallel to the main blasting leads if electrical power is available. When the firing is done by means of a blasting machine, the several holes are connected in a series circuit, since the electrical output of the machine is of comparatively high potential but of limited amperage.

To correctly estimate the resistance of a series-connected circuit, the blaster must know the ohmic resistance of the particular brand of caps used as different brands vary somewhat. Usually the resistance of a cap is about 2 ohms.

The resistance of copper lead wire is as follows:

Brown & Sharpe Gauge of Wire	Resistance in Ohms Per 1,000 ft.
No. 8	0.6271
No. 10	0.9972
No. 12	1.586
No. 14	2.521
No. 16	4.009
No. 18	6.374
No. 20	10.14
No. 21	12.78
No. 22	16.12

For instance, if 30 blasting caps are used together with 100 ft. of No. 20 connecting wire and 500 ft. of No. 16 leading wire, the total resistance of the circuit is

30 caps (about 2 ohms per cap)	60 ohms
100 ft. of No. 20 Wire	1 ohm
500 ft. of No. 16 Wire	2 ohms
Total resistance of circuit	63 ohms

If all the joints in the wiring are well made and kept free of cont with conducting materials, the ga anometer should read 63 ohms for above circuit. Rock containing mi eral salts, alkali or acid will read reduce the resistance of a circuit a will frequently result in misfires permitting the firing current to pass the caps. Waterproof caps a enameled leg wires will prevent su occurrence in most instances.

The galvanometer can be used detect defective insulation by co necting one binding post to a grou connection and applying the seco post to one side of the shot circu Should the resistance through ground be less than through the wi circuit, a misfire will result, since greater portion of the firing curre will follow the shorter path throu the water or earth.

While the galvanometer is built withstand rugged service, its period usefulness can be materially increas by careful handling and storing. leather cover should always be ke closed when the instrument is not use to prevent metallic objects fro making contact with the binding po and thus discharging the expensi silver chloride cell. Also, the galva ometer should be stored in a dry plac since continued exposure to moistu will damage the delicate electric parts and cause the cell to disin grate.

When properly used, one cell be sufficient for several thousand te depending on how long the current permitted to flow in the test circu Only a few organizations have the quired laboratory facilities for repa ing and checking a galvanometer, a with the exception of replacing an e hausted cell, repairs should not be tempted by the user. It is suggest that a spare unit be kept on ha against emergencies, and that a d fective galvanometer be shipped the manufacturer for general ov haul and repair.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Marston Mat on Islands of the Pacific

N. A. Bowers
Pacific Coast Editor, Engineering News-Record

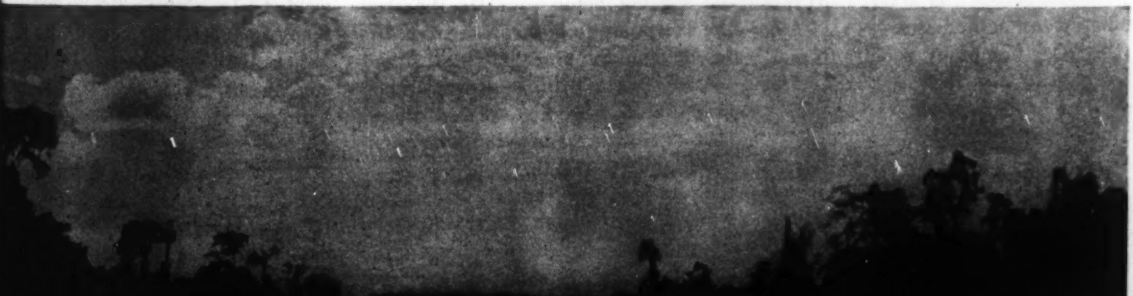
***ontents in Brief**—Large quantities of steel mat for surfacing airstrips ave been sent to Pacific areas. Its use for this purpose by the Navy has ecreased as methods have been developed for surfacing runways with local aterials. For satisfactory service the mat requires adequate, well-drained undation. Reference is made to rates of laying, means of taking up slack d to incidental uses.*

ANY MILLION SQUARE FEET of Mars-n mat, the perforated steel sheets esigned for surfacing on airfields, as been shipped out into the Pacific eaters of operation where it was an nportant construction material in rly stages of the war. Later, as there as been time to study local materials nd to develop ways and means of sing them to advantage, the Navy, t least, has had less frequent occasion resort to the steel mat. With the sultant supplies of mat on hand at mote locations where construction aterials are scarce and hard to get, there has been ingenious application of the mat to an incredibly long list of uses other than those for which it was expressly intended.

As airstrip surfacing the mat cannot be expected to carry heavy loads, such as bomber wheels, on anything less than an adequate, well-drained foundation. Wherever this fundamental has been disregarded there has been unsatisfactory service and excessive maintenance. On the other hand, where the base is substantial but the surface needs protection, as from excessive raveling or dusting, the mat finds its special field of usefulness. In the following are presented notes on the Navy's South Pacific experience in laying and maintaining the mat.

There were numerous emergencies in the early stages of war in the Pacific that called for airstrip construction with an absolute minimum of delay. Some of these were met by rushing in Marston mat and laying it at top speed, under fire. In this way time of extremely great military value was undoubtedly saved. No criticism should be made of the construction plan that gave no thought, under such circumstances, to a more deliberate and thorough study of foundation conditions.

As the enemy has been pushed back, however, and there has been time to investigate and develop methods of using local materials, particu-



Marston mat arrives on the job in bundles which are distributed by trucks over the area to be surfaced.

Clips are used to fasten adjacent pieces of the mat together; end joints are staggered to tie sections together in opposite direction.

larly coral deposits (*ENR*, July 13, v. 1, p. 26) the mat has come to be regarded less as a primary surfacing material and more as a supplementary means of holding the top surface of runways made with materials whose bonding qualities are not the best.

A summary of the present policy in the Navy's construction battalions regarding the use of Marston mat is as follows:

1. Its use is appropriate where satisfactory surfacing material is not available. Also it can often be used to advantage on hardstands, for making plane revetments and in many other ways.

2. In planning its use, comparisons should not overlook (a) higher cost and more difficulty in handling than for local materials and (b) shipping space that is required to transport this material to Pacific bases.

3. After bombings, repairs to mat-covered airstrips take more time and are more difficult than corresponding repairs on coral runways.

Mat laying operations

Individual pieces of the mat are 16 in. wide and 10 ft. long; the weight is 4.8 lb. per sq. ft. As originally shipped, they were packaged in 2½-ton bundles containing 1,000 sq. ft., bound with metal straps. These bundles proved to be too heavy for convenient handling. Under emergency landing conditions the bundles were sometimes unfastened so that the pieces could be carried individually, by hand. When equipment for lifting the bundles was available, the cargo slings with heavy steel spreader, shipped with the mat, were soon abandoned in favor of a chain with a hinged T-bar at each end. The hinge at the central point permits the T-head of the bar to be thrust through the aligned holes near ends of the bundle. The hinged head is then turned across the sheet to prevent withdrawal as the bundle is lifted. This type of sling is extremely simple and requires no spreader.

After two reductions in bundle size the standard package now weighs only one quarter as much as at first, that is 1,250 lb., and contains 20 pieces instead of the original 80.

Though laying operations have to be suited to conditions, ordinarily the bundles of sheets are distributed on the airstrip by truck crews, the bundle spacing being equal to the area the sheets are to cover. Mat from different manufacturers has been found to vary 1½ to 2 in. in length. Some sheets had end holes sheared off on centers instead of between holes as it should be. At first two clips per sheet, the standard requirement, was all that came with the mat. Extra clips are now being supplied to make up for the shortages in early work where three or four per sheet were used on some parts of the area, thus leaving sheets toward the end of the job with no clips at all.

A mat-laying crew under expert direction soon learns to avoid irregularities in the central portion of the strip, the important zone, by taking the slight additional time required to begin work along the center line and work toward the edges. This tends to carry any irregularities over into th zones along the edges where plane rarely travel. Another scheme to ge the best possible job is to have available a truck with a winch for taking up slack. After an advance of 50 to 75 ft. this winch is used to pull forward on the leading edge of mat jus laid to tighten up the joints. This wa found to give the surface better alignment and to prevent individual ma sheets from working loose. It also decreased rattling under traffic. This practice was used with good effect for instance, at Torokina on Bougainville Island.

With crews of 100 to 150 men, rate of progress in laying mat on several airstrips in the Solomon Islands (o 100 and 150-ft. surfaced widths) ranged from 70 to 115 sq. ft. per man-hour. Based on average figures, a 6,000-ft. strip can probably be covered with mat in about 4½ days, using four crews of 50 men each, working 10 hours per day.

Maintenance and repair

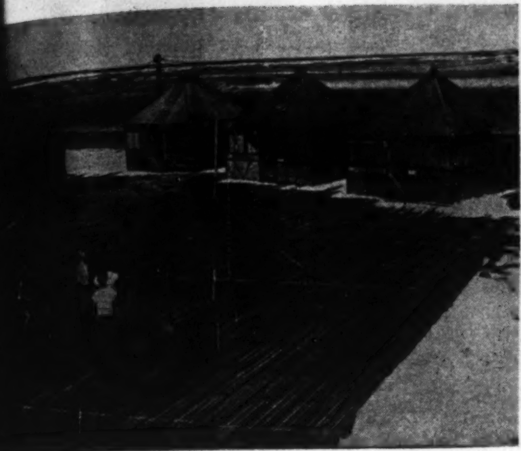
On airstrips hastily prepared for mat surfacing there is sometimes "spotty" settlement, causing low areas that have to be brought up to grade by the maintenance crews. If these areas are large enough and if traffic on the strip permits, the usual method is to burn through the mat with a cutting torch and remove the mat from the entire area to be raised. Then trucks, scrapers and rollers can work to advantage in placing and compacting the necessary fill after which mat is again put down and welded along the edges, to that already in place.

For smaller areas the raising is accomplished by working material by hand through the holes in the mat. The fill material is dumped on the mat, spread to a uniform thickness of usually not more than 2 in., and then the mat is pulled upward slightly with hooks while the overlying material is worked down through the holes.

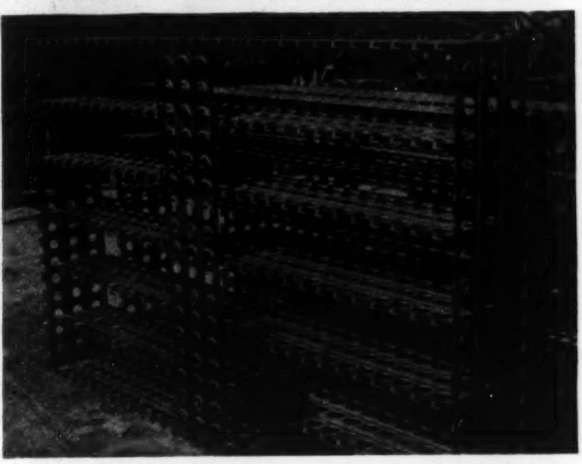
Although a great deal of this regrading through the mat has been done, no satisfactory way has been found to give the resultant surface an exact grade; minor irregularities are almost inevitable.

At one very busy field on a large island close to enemy lines, it was not feasible to take the entire strip out of service for correcting grade

Marston Mats Have Many Uses



Surfacing for a camp and volley ball court.

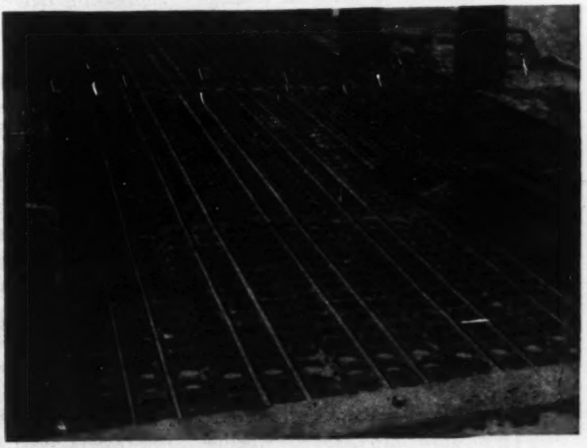


Shelves made up in sections for warehouse storage.

Floors for tents pitched close together.

Tube storage. Note sections cut away.

Facing for sand embankment.



Deck for small boat wharf.

Individual pieces of Marston steel mat are taken from the bundles and laid in place by hand.

Each perforation in the mat has downward projections around its periphery for gripping the base.

irregularities over considerable areas. The hand method of raising the mat was therefore tried here on a large scale. A volcanic ash or scoria was dumped on the mat and spread with a road grader whose blade had been turned backward to make the spreading more effective. Then the material was broomed by hand to work it into the holes. As a means of speeding this operation an experiment was tried with heavy sprinkling, that amounted almost to a flushing, substituted for the brooming. Day and night trucks moved over the surface carrying pontoon cells from which large volumes of water flowed in torrents over the surface and down through the holes, washing down with it the light volcanic material. This resulted in a tight "water-laid" layer under the mat and thereafter there was no looseness and very little rattle, even from an automobile driven over the runway at 50 mph.

When the mat becomes grooved or bent while in place there is not much that can be done in the line of repair. Machines for straightening and reconditioning the mat (after which it should be repainted) are not yet available in Pacific areas. Meantime, the labor involved is such that it is considered preferable to use new sheets in replacing damaged mat.

An unfortunate instance

On runways in the Solomons where some 3½ million square feet of mat had been put down in an extreme emergency early in the campaign, the foundation was too soft to support the mat under the heavy loads imposed. At one time a choking of adjoining streams caused a flood tha inundated the entire field. Under suc conditions the mat could not be expected to function well. The inevitable grooving and rutting of the ma that resulted from heavy planes landing on steel sheets with inadequat support, eventually made it necessar to take the runway out of service an remove the entire mat surfacing.

Maintenance problem continues

This field was then resurfaced wit new mat, after only partial remedy o the foundation condition. Despite extremely heavy maintenance work an strenuous endeavor to repair lo spots with coral put down through th holes, some form of reconstruction o the entire area of the second mat surfacing was a fast-approaching necessity as this was written.

An experiment looking to remed of excessive maintenance on on Marston mat surface and to reducin of damage to tail wheels of aircraf was made on 1,000-ft. lengths at each end of the 7,000-ft. runway. Thes end portions of the strip, which ar on fairly good foundation, are 150 ft wide.

On these areas was placed Irving steel grid laid in a 1¼-in. surfacing of concrete made with three sack of cement per cubic yard of pit ru gravel. This paving was laid in strip 8 ft. wide, running transverse to th airstrip centerline. After the last pour five days were allowed for the concrete to set during which time it wa kept continually wet.

After about five months of use thi surfacing was still in a highly satisfactory condition. The plan of havin specially good surfaces at ends o runways is favored particularly because it eliminated the dusting an raveling of these locations wher planes most frequently "rev-up" thei motors prior to takeoff, hence makin dust conditions particularly bad.

Just a few Marston mat uses tha indicate the wide range of applications observed are: Fences and barricades, well lining, bridge decks, tras and garbage burners, floors in tent and dugouts, dugout stairways sheathing for pile piers, surfacing fo hardstands and recreation areas, ai raid shelter lining, freight pallets benches and tables, breastwork facin and cookstove tops.

Principles for Public Works Programs

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***ontents in Brief**—When and if there is a large federal works program combat unemployment, the mistakes of WPA should be avoided. Projects ould be worthwhile; there should be no "means test" for workers; whicher is best for a given job, contract or force account operation, should e used; pay and hours should be less attractive than in private employent; administration should be decentralized and as non-political as possible. lans should be ready for a year's construction program and under preparaon for a six-year program.*

IN CONSIDERING a public works proam, the most usual questions are:

1. How are the works to be paid r?

2. How is the program to be cared out?

In the contacts of the Wisconsin tate Planning Board with local govrnments, we have advocated a simple st of the desirability of a particular roject. We have said that, unless e project is considered so necessary r desirable that the community is illing to construct it some day, some me, alone and unaided, if no aid is ailable, then the project should not e decided upon.

We have urged, however, that if the roject met this test, plans should be ndertaken, even though the finances re not in sight. The availability of orking plans will place the comunity in a position to take advantge of any aid that may become available through any federal or other proam that may be initiated. There is mple experience to substantiate this roposition. There is also ample exrience to demonstrate that preparaon of plans will often point the way the realization of an objective.

Execution of program

In considering answers to the secd question, WPA generally is rought into the discussion. Differnt points of view were well expressed y an editorial (*ENR* December 17, 942) entitled "The End of WPA," d the reply of Mr. Perry A. Fellows, hief Engineer of WPA (*ENR* January 14, 1943). The editorial flays the WPA while Mr. Fellows defends it according to the orthodox formula. The editorial's final word was, "On its record, WPA was not a success. It deserves to be remembered only to avoid its repetition." The writer would say that it should be remembered in order to avoid a repetition of its mistakes. For it seems very probable, whether we like it or not, that there will be another federally-sponsored works program after the war, in which much of the work will be done by force account. Therefore, it behooves us to profit from the experience of WPA, which operated for nearly eight years, from July, 1935 to February, 1943.

Before presuming to express his views of what such a postwar program should be, the writer wishes to cite his experience with WPA. He served as state administrator in Wisconsin from February, 1936 to October, 1937, inclusive. The job was wished on him, and he was not in a position to turn it down, much as he disliked it. He left it voluntarily, even gladly. Being loaned by the state, he drew no salary from WPA.

His service began just at the end of the mushroom growth following the establishment of the program in July, 1935. In the course of it, he entertained what was probably the first sit-down strike in the United States, when the Workers Alliance took over the Capitol in March, 1936. He went through the hotly contested Presidential campaign of that year, when most of the heat regarding alleged political activities was engendered.

During his service and afterward, he operated several WPA projects as sponsor's agent in his capacity as executive officer of the State Planning Board, with results that have been satisfactory as a whole. He gets some satisfaction from the fact that his administration was the subject of very little public criticism, none at all on the score of alleged political activity. From these facts it is plain that he has no cause to be prejudiced in favor of WPA and that he was in a position to observe its modus operandi.

What was wrong with WPA

The fundamental faults of WPA stemmed from two sources. The first was its basic philosophy, the second its lack of preparation, which was almost total.

The purpose of WPA, according to the orthodox formula, as stated by the writer in many public addresses on the subject, was that "WPA exists to pay the wages of certified employees engaged in carrying out worthwhile projects sponsored by local municipal governments." As construed by the Division of Operations, it meant that WPA was primarily a construction operation carried out in the most efficient practicable manner. As construed by the social workers, it meant that WPA was primarily a relief proposition, that the job was carried out as a justification for putting "certified" workers on the payroll. If the work could be done efficiently and effectively, well and good, but if the circumstances were such that this could not be done, the project should be operated nevertheless.

In general, the viewpoint of the social workers, who were everywhere present, dominated the administration. The regulations required that the Division of Employment should have a social worker, as director or assistant director. This regulation was applicable all the way down from the national administration in Washington to the district administrations within the states. The thing that mattered was the presence at the particular place of a number of "certified" persons in need of employment. As a consequence, there were attempts (sometimes successful) to set up projects that were positively fantastic, and the doing of others by methods that were decidedly uneconomic.

Security wage idea impracticable

The operation of WPA primarily as a relief measure resulted in a number of difficulties which were particularly evident on construction projects. The first of these was the application of the schedule of security wages. Certain maximum earnings per month were fixed in general by counties, according to the population of the most populous political unit within the county. The hourly rates having been determined according to the prevailing wage as nearly as could be, the number of hours of labor per month for any particular classification was arrived at by dividing the monthly wage by the hourly rate.

The difficulty in connection with this arose from the fact that the number of hours worked by workers in different classifications was not the same. For instance, the basic wage for workers in rural areas in Wisconsin was $40 per month. By reason of a state code specifying 40c. per hr. as the minimum hourly rate consistent with a decent standard of living, the hourly rate for WPA workers was immediately fixed at 40c., the result being that the number of hours worked per month by common labor was 100. Because the number of hours worked by substantially all of the skilled classifications was different, it was not possible to operate jobs with uniform hours for all classifications, and some confusion resulted from this cause.

The word "certified," as used in the formula previously expressed, meant that the worker had met the so-called "means test"; that he had been certified as being in need of relief. When so certified, the individual was entitled to a job if a project on which he could be employed was operating. Of course, there were certain exceptions to this rule, particularly as regards the selection and use of administrative employees.

Now the fact was that $40 for 100 hours of work was substantially higher than the prevailing wage in the rural districts in most parts of Wisconsin. There were some, and in a number that was not inconsiderable, who preferred WPA to private employment in the same locality. It became difficult in many places for farmers to get help during the haying and harvesting season. Even though it was possible to earn more money from the farmers, the hours were longer and the job was considered less desirable. Also, workers who voluntarily left WPA in order to accept farm employment often had great difficulty in getting back on WPA rolls after the private employment ceased; consequently they preferred the shorter hours and comparative certainty of WPA employment.

Another bad feature of the requirement of relief status as a prerequisite of employment had to do with the so-called "border-line" cases. These were people who were able to earn the greater portion of their livelihood in private employment, but who could not quite make ends meet. In order to get a job on WPA, it was necessary for them to be on relief, and a great many of them took steps to acquire relief status. For example many persons who were earning portions of their living from their farms, sold their cattle and got rid of other property in various ways in order to get on relief and thus be eligible for a job on WPA.

Many of WPA's difficulties arose from attempts by the administration in Washington to lay down fixed rules which would be of uniform application, and make it unnecessary, in fact impossible, for the local administration to exercise any degree of discretion. This policy had certain advantages, of course. It was possible for the Administrator to point to the rules and tell disaffected people that he had no discretion. Nevertheless, it was an expensive procedure and extremely destructive to morale.

WPA started without preparation

As stated, the second great cause of difficulty in connection with the operation of the WPA program was the lack of preparation. Although
various kinds of works programs suc
as CAA, CWA and FERA had be
under way since the late fall of 193
little if any effort had been made
prepare for the much larger progr
under WPA. This was launched at
meeting held in Chicago, July 1 a
2, 1935, which was attended by admi
istrators from all the states and t
experts from Washington. In the
two brief days, the program was e
plained and the state administrato
were sent home with instructions
put it into effect in their respecti
states.

To do this it was necessary to bui
up their state administrative orga
izations, to decide on projects th
could put a large number of peop
to work at once, and to organi
forces for carrying out these projec
The great emphasis was on gettin
people to work immediately. In Wi
consin, an average state, the numb
of security wage workers as of D
cember, 1935 (5 months later) w
about 65,000 of which 2,600 we
doing administrative work. Is
then to be wondered at that the
was much inefficiency? The marv
is that there was not much more
efficient conduct.

Good sponsors, good projects

As regards the conduct of the
dividual projects, the writer's beli
based on his experience is that
substantially all cases the proje
were just about as good as the spo
sors. Where the sponsors had pla
that could be followed, where th
were in a position to provide
other-than-labor costs that could
be provided by WPA and the ski
that were not available under WP
a generally good job was done at re
sonable costs. Where these facto
were not favorable, the job genera
was either poorly done or unduly
pensive, or both.

The writer does not believe
any great part of the waste that
curred on WPA can fairly be
tributed to the workers. He
familiar with the stale jokes that we
bandied about concerning the la
ness and inefficiency of WPA worke
but very little of such faults ca
under his observation. In so far
the mass of the workers was co
cerned, they were poor people wh
chief concern was to stay on
pay roll in order that they mi
draw the wages and thereby be in

tion to buy some, if not all, of
necessities of life. It is true that
many caes they did not work as
iently as ordinary contract labor,
by and large the sweeping asser-
s regarding their laziness and in-
iency are very much exaggerated
very unjust.

s regards the supervisory staff on
construction projects, the writer
make similar statements. Many
of proven ability and high quali-
ions were employed on the super-
ry staff of WPA, as the writer
testify from personal acquaint-
and rather intimate knowledge
construction activities extending
more than 20 years before WPA
undertaken. These men worked
as faithfully for WPA as they
formerly worked on contract
.

The political angle of WPA

he writer will not attempt to go
further detail with reference to
faults of WPA; substantially all
hem resulted from the two basic
ses named. Nor will he attempt
say what should be done about
ecting the evil influence of politi-
manipulations in connection with
work program. No one will
tend that the contract system is a
acea for such ills. Unless and
il American public opinion makes
mpossible for them to exist, there
be no particular improvement.

ertainly the writer has no magic
mula, even though his adminis-
ion was not troubled very much
politics. This probably was due
the fact that the major political
sonages then in control in this state
the opinion that attempts to ma-
ulate WPA politically would prob-
do more harm than good, and
e no attempts in that direction.
bush-league politicians were a
, however.

ut the two great causes of diffi-
y, namely, the establishment of a
onable basic philosophy for the
duct of the work, and the making
uitable preparation for undertak-
it, are capable of accomplishment.
regards the first of these, the
er would offer the following spe-
comments:

hat in the public works program
is to come, the tried and tested
cedures for carrying out such
ations should be followed. Work-
on these projects should be employed because they need and desire to work on them. There should be nothing resembling the means test, which was so demoralizing on WPA activities.

Projects should be chosen because of their desirability from the standpoint of public usefulness, not because there happened to be in the locality a considerable number of people desiring employment. Projects should be constructed in the most efficient manner, whether by contract or by force account, as seemed best for the particular project. The hours of labor and the rates of pay on any postwar job should be those prevailing in the vicinity. Probably employment on the postwar public works program should be slightly less desirable than would be the case with private employment, in order that workers should be encouraged to seek private employment rather than a day-labor public works job. In particular, the wages and hours in rural districts should not be such as to make it difficult to get men to work on the farms.

Have plans ready, more underway

It goes without saying that it is possible to make adequate preparation for the coming public works program in the way of plans, but this, too, is contingent on the state of public opinion. General Fleming, the head of the Federal Works Agency is quoted as follows:

"As I see it the type of planning for public works which we now need is one in which the preliminaries will be gotten out of the way before the war ends: the site will be acquired, the legal conditions will be met, the plans for financing will be made, the blueprints will be drawn and the specifications written. And then, in the hour of need, we can pull the blueprints out of the cupboard, hand them to the contractor, lead him out to the site and say: 'You begin digging here at 7 c'clock tomorrow morning'."

General Fleming's advice is excellent, but the writer would offer the following qualification. Have enough of these "blue prints" to get the work off to a good start. In a six-year program have the "blue prints" ready for the first year or possibly two years. Have studies in various stages for the rest. As anyone who has tried to hire qualified engineers, architects, etc., will know, they are scarce. Most of them are in the armed forces. They will want to work at their professions when they get back. There are other good reasons, which need not be enumerated, why a six-year program should not be planned in advance to the last detail.

Nothing has been said so far regarding the extent of possible accomplishment of a postwar public works program. An authority no less eminent than Beardsley Ruml has expressed the opinion that about the best that can be hoped for is the stabilization of the construction industry itself. The writer has great respect for this opinion. It is not reasonable to expect that public works construction shall be a catch-all for all unemployment. What shall it profit to take employment away from the skilled construction worker and give it to some unskilled person? Both will lose in the process.

The writer speaks from experience in this case. Back in 1932 he was chief engineer of the Wisconsin State Highway Commission during Governor Phil La Follette's railway grade crossing separation program. A construction project was located close to a city where there was a strike in a knitting industry, with consequent unemployment. Over the vigorous protest of the contractor, the construction workers were laid off and the knitting mill workers put to work. Nature took its course, the knitters just could not stand up to the work. In less than a week the horny-handed construction workers were back, and the job proceeded to completion without further incident. But, if the construction business can be stabilized, that will be a great achievement in itself.

Day labor program, too

In referring to a public works program, most people have in mind such things as canals, dams, super-highways, public buildings, city parks and things of that nature, projects that result in monumental works which lend themselves particularly to execution by the contract system, where the competition is keenest and where the skills required are of the highest grade. The writer believes, however, that there is another class of public works which are much neglected even though more necessary than some of those referred to, which can be undertaken with a minimum of "blue prints" and which are capable of providing employment for a less skilled and less efficient class of labor than that required under the contract system. He believes that there can be great reservoirs of public works opportunities on projects of this kind, where a man who has to have a job can always get it, where workers who are not able to meet the keen competition set on contract jobs can still render a useful service. The following will give a brief idea of a few of them.

The first and most important is in the field of soil conservation. It is not necessary to explain the damage that soil erosion is doing, or the necessity for controlling it. A second is that of reforestation, which has always been recognized as necessary and which will be of greatly increased importance after the war, in view of the terrific cutting of the usable timber as a portion of the war effort. And a third type of work is the eradication of noxious weeds. This field is not as thoroughly explored as those mentioned previously, but an extensive weed eradication program would operate over the entire agricultural portion of the country with the greatest of benefits.

There is another important field which might be mentioned, and that is in the modernization of many old and partially obsolete roads and streets. For the most part, the principal objection is that the roadways are too narrow. Most of these roads could be rendered capable of giving many additional years of service if the shoulders were widened from their present 3 ft. to 10 feet on both sides. If common sense and good judgment are used, this can be accomplished without any formal plans, simply by grading to the existing pavements, and without the purchase of much additional right-of-way. Such improvements would not interfere with the construction of the highest grade highways, freeways, superhighways, etc., since these will generally be built on relocations.

In all of these fields there are existing organizations that have plans and are in a position to employ almost immediately hundreds of thousands of men in these most useful and necessary works, which would not in any way compete with public works as ordinarily considered, not even in their bids for labor.

A final statement of principle

The justification for public works of various kinds rests on their usefulness. Once built, they should be maintained in a condition of use ness. Because the cost of their m tenance will always be a burden a construction, it should not be assum unless there are adequate bene Therefore, it follows that they sho never be built unless they will ren a useful service. The mere fact t their construction will afford empl ment does not justify them.

But as a whole, the country great need of many public facilitie hospitals, schools, sanitary facilit highways, airports, waterways. renewable natural resources sho be built up. Those that are irrepl able should be conserved. The exe tion of these and other necess public works is simply putting house in order on a nation-wide sc There is more work needing to done than there are people to do it

But after all, a public works p gram can play only a minor part the postwar rehabilitation of the co try. Major reliance must be industry and agriculture, but pub works programs, intelligently adm istered, can serve as equalizers, be speeded up or slowed down as needs demand. It remains for Ame can foresight to plan a system administration by which the pub works program can be operated to best advantage.

Nationwide Sewage Disposal Needs Call for 2¼ Billion Expenditure

***Contents in Brief**—A yardstick of postwar needs in the field of sewage disposal is provided by the U. S. Public Health Service, which estimates that adequate facilities for municipal and industrial waste disposal will cost at least $2,255,000,000. Most of the required work will be in communities of the less-than-1,000 population group.*

ADDITIONAL SEWAGE DISPOSAL FACILITIES needed in the United States are estimated to cost $2,255,150,000, according to an inventory compiled by the U. S. Public Health Service. Of this total, new sewer systems and extensions in 13,271 communities will represent a cost of $656,190,000, intercepting sewers incidental to the addition of treatment works to existing sewer systems in 2,804 places will call for the expenditure of $559,160,000, and sewage and industrial waste treatment in 10,522 locations will require $1,049,800,000.

This information is contained in a report by the Sanitary Engineering Division, U.S.P.H.S., published in the July 7 issue of *Public Health Reports*, (Vol. 59, No. 27). It is the second nationwide survey by the Public Health Service dealing with sanitary engineering deficiencies, the first study having dealt with water supply needs (*ENR*, Mar. 23, 1944, p. 420).

The latest report calls attention to the fact that the greatest deficiency in municipal sanitary facilities is in the smaller communities with popu tions under 1,000, as indicated by following comparison between total number of incorporated pla (classified into three groups acco ing to population), and the numb of these communities served by pub sanitary facilities.

Population group	Number of Communities	Number sewer
5,000 and over	2,042	1,966
1,000 to 5,000	4,627	3,670
Under 1,000	10,083	1,848

This tabulation shows that m than 96 percent of the places in 5,000-and-over population group served by public sanitary syste and about 80 percent in the mid group, but only 18 percent in the than-1,000 group. Other data disc that the needs for extension of ex ing sewer systems to serve an ad tional population of 10,297,000 measurably greater than for construction of new syste These new systems are needed rve 4,836,000. Furthermore, the ecessity for treatment of raw sewage ow being discharged through sewer ystems presents a considerably rger problem than the needs for additional sewer facilities.

Historical background

In outlining the present status of anitary facilities in the United States, e report points out that public ewerage dates historically from the ar 1855 when the first comprehensive system in this country was degned for the city of Chicago. In 860, about 1,000,000 people of a tal urban population of 6,000,000 ere provided with some kind of ewerage; at the turn of the century, 5,000,000 of 72,000,000 had these facilities; and in 1942, 70,900,000 of of 81,000,000 were connected to sewers. Today, 7,484 incorporated communities of more than 200 population, having a combined population of 78,906,000, are provided with sewerage facilities, either wholly or in part.

In 1900, there were about 60 municipal sewage treatment plants serving a population of some 1,000,000, or 4 percent of the total living in sewered communities. In 1935, there were approximately 3,700 municipal treatment plants serving a population of 28,500,000, or 41 percent of the total resident in sewered communities.

During the five years, 1935-40, under the stimulus of Federal-aid projects, the number of treatment plants and population served increased phenomenally, so that at the end of 1942 treatment facilities serving 5,100 communities were provided as follows: minor treatment was provided by 50 plants serving 3,300,000 people; primary treatment, by 3,848 plants serving 15,900,000; intermediate and secondary treatment, by 2,712 plants serving 23,000,000. A total of 42,200,000 people was served with some treatment by 5,610 plants; of this number 1,168 plants also provided chlorination.

STIMATED COST OF SEWERS, SEWAGE TREATMENT, AND INDUSTRIAL WASTES TREATMENT NEEDS IN VARIOUS STATES

(In thousands of dollars)

States	Sewers		Municipal treatment			Independent industrial waste correction	Combined total
	New systems and extensions	Interceptors	Domestic sewage	Industrial wastes	Total		
abama	$16,240	$5,490	$11,280	$2,370	$13,650	$2,480	$37,860
izona	1,510	210	950	200	1,150	210	3,080
kansas	10,220	2,610	9,650	2,030	11,680	2,120	26,630
alifornia	60,970	33,470	32,610	6,850	39,460	7,170	131,070
olorado	5,440	810	5,610	1,180	6,790	1,230	14,270
onnecticut	6,780	2,660	5,310	1,110	6,420	1,170	17,030
elaware	1,730	1,520	2,110	440	2,550	460	6,260
istrict of Columbia	8,580	8,580	6,600	[1] 1,390	7,990	[1] 1,450	26,600
orida	20,660	7,440	12,540	2,630	15,170	2,760	46,630
eorgia	22,950	6,460	16,950	3,560	20,510	3,730	53,650
aho	5,720	1,400	5,030	1,060	6,090	1,110	14,320
inois	43,920	12,280	51,360	10,790	62,150	11,300	129,650
diana	20,420	13,040	20,890	4,390	25,280	4,600	63,340
wa	14,740	4,580	16,690	3,510	20,200	3,670	43,190
ansas	11,170	2,850	10,040	2,110	12,150	2,210	28,380
entucky	9,970	12,780	11,930	2,500	14,430	2,620	39,800
ouisiana	11,760	9,760	11,200	2,350	13,550	2,460	37,530
aine	3,670	4,310	4,260	890	5,150	940	14,070
aryland	12,170	13,520	5,790	1,220	7,010	1,270	33,970
assachusetts	16,080	48,090	37,220	7,820	45,040	8,190	117,400
ichigan	9,400	15,510	14,100	2,960	17,060	3,100	45,070
innesota	19,240	1,950	12,540	2,630	15,170	2,760	39,120
ississippi	10,120	4,030	9,970	2,090	12,060	2,190	28,400
issouri	24,140	18,770	27,250	5,720	32,970	6,000	81,880
ontana	2,450	2,130	4,180	880	6,060	920	10,560
ebraska	7,080	3,980	10,300	2,160	12,460	2,270	25,790
evada	360	30	230	50	280	50	720
w Hampshire	3,200	3,060	3,200	670	3,870	700	10,830
w Jersey	13,690	9,750	13,830	2,900	16,730	3,040	42,210
w Mexico	2,710	100	1,240	260	1,500	270	4,580
w York	39,720	74,620	96,430	20,250	116,680	21,210	252,230
rth Carolina	15,020	6,160	15,290	3,210	18,500	3,360	43,040
rth Dakota	4,800	360	5,460	1,150	6,610	1,200	12,970
lahoma	8,610	1,800	12,150	2,550	14,700	2,670	[1]27,780
io	33,860	37,520	27,810	7,940	45,750	8,320	125,450
gon	3,790	8,980	7,470	1,570	9,040	1,640	23,450
nnsylvania	53,840	102,510	80,870	16,980	97,850	[1]17,790	[1]271,990
ode Island	6,470	2,040	2,410	510	2,920	530	11,960
th Carolina	7,020	2,650	6,960	1,440	8,300	1,510	19,480
th Dakota	3,100	300	4,230	890	5,120	930	9,450
nessee	14,250	25,340	13,690	2,870	16,560	3,010	59,160
as	34,100	2,860	11,210	2,350	13,560	2,470	52,990
h	8,950	3,200	7,200	1,510	8,710	1,580	22,440
mont	1,090	1,310	3,070	640	3,710	670	6,780
ginia	6,440	15,130	15,750	3,310	19,060	3,460	44,090
hington	11,770	10,960	11,720	2,460	14,180	2,580	39,490
t Virginia	4,490	9,850	11,390	2,390	13,780	2,510	30,630
consin	10,550	1,680	7,290	1,530	8,820	1,600	22,650
oming	1,230	720	2,020	420	2,440	440	4,830
Total	656,190	559,160	727,180	152,690	879,870	159,930	2,255,150

Water pollution

In 1942, the natural waterways of the United States were receiving raw sewage from 29,000,000 people, and sewage treated to some degree from 42,000,000 more. The total pollution resulting from both raw and partially treated sewage is estimated to be equivalent to the raw sewage emanated from a population of 47,000,000.

For the entire country, it is estimated roughly that the total industrial waste pollution is equivalent to the raw sewage discharge by a population of 55,000,000 or 60,000,000. On this basis, it is estimated that the combined municipal sewage and industrial waste pollution for the country as a whole approximates the raw sewage contribution of not less than 100,000,000 people.

These figures afford an index of the present extent of water pollution in the United States and the magnitude of the problem of pollution abatement. Although it would be extremely hazardous to estimate from the available data what the total economic burden imposed by water pollution may be, it is safe to say that it probably amounts to at least $1 per capita annually for 75 percent of the entire population of the United States, or roughly $100,000,000 annually for the entire country.

Method of estimating cost

In establishing a basis for estimating the cost of future projects, a study was made of the per capita cost of sewerage and sewage disposal projects as reported by the Public Works Administration in *Publication No. 104.* This document shows the location, description and cost of sewerage and sewage disposal construction by the PWA during the period 1933-39.

Altogether 289 PWA projects were considered. It was found that the per capita cost of new sewer systems with treatment included, and also that of new treatment plants alone, diminished with increasing numbers of population served, but at a decreasing rate. The difference between the two curves, which is a measure of the cost of sewer systems without treatment plants, remained fairly constant at all ranges of population, averaging $31 per capita. This figure is used as representing the per capita cost of sewer systems at the 1933-39 price level.

For intercepting sewers, the unit cost was assumed at $5 per capita for communities under 10,000, and $10 per capita for communities over 10,000, which unit costs were developed in connection with Public Health Service studies on the Ohio River.

In discussing cost, the report points out that following the last war construction costs varied considerably and that, at the present time, construction costs are about 32 percent higher than in the period 1933-39, so, for estimating future needs, the per capita costs were increased by 32 percent in order to conform to present-day prices of materials and labor.

The total estimated cost of additional sanitary facilities needed, as indicated by present inventory data, is found to be $2,255,150,000, and is distributed as follows:

New systems and extensions	13,271	$656,190,000
Intercepting sewers for existing systems	2,804	559,160,000
Treatment plants	10,522	1,039,800,000

A distribution of the estimated needs, by states, is shown in the accompanying tabulation. Referring to the table, it will be noted that the total cost of sewage treatment, when added to that of new intercepting sewers, amounts to 57 percent of the total cost of the entire program. Industrial waste treatment, both separately and in combination with sewage treatment, accounts for an additional 14 percent of this total cost.

The assumption of an average useful life of 30 years for the various parts of the proposed system, and an interest rate of 3 percent, results in an estimated annual financing cost of $115,000,000 per year for the entire program outlined in the report. Similarly, the annual financing cost of that portion of the program which is attributable directly to pollution abatement would approximate $81,500,000. If to this figure there is added the annual operating and maintenance costs, estimated at $35,000,000, of the works involved in the abatement of the existing stream pollution, a total estimated annual cost of $116,500,000 is thereby obtained.

The saving of the annual cost of present water pollution, conservatively estimated at $100,000,000 per year on the basis of its total economic damage, would very nearly pay the entire cost of the abatement program. From this standpoint, pollution abatement as a national project would be practically self-liquidating, says the report, adding that its intangible benefits probably would greatly exceed any economic benefits which might be conceived.

Complete report available

Complete copies of the report from which this material was extracted, are for sale by the Superintendent of Documents, Washington, D. C., at 5 cents each. Ask for Vol. 59, No. 27, issue of *Public Health Reports*, dated July 7, 1944.

New York State's Housing Program Progresses

New York's Division of Housing has contracted with municipal housing authorities for the postwar construction of 15 projects to provide 13,351 homes for low-income families. Sites for these projects are being acquired, and architects are at work on site and unit plans. Loan contracts for war and postwar housing in New York already total about $123,000,000, the National Association of Housing Officials reports.

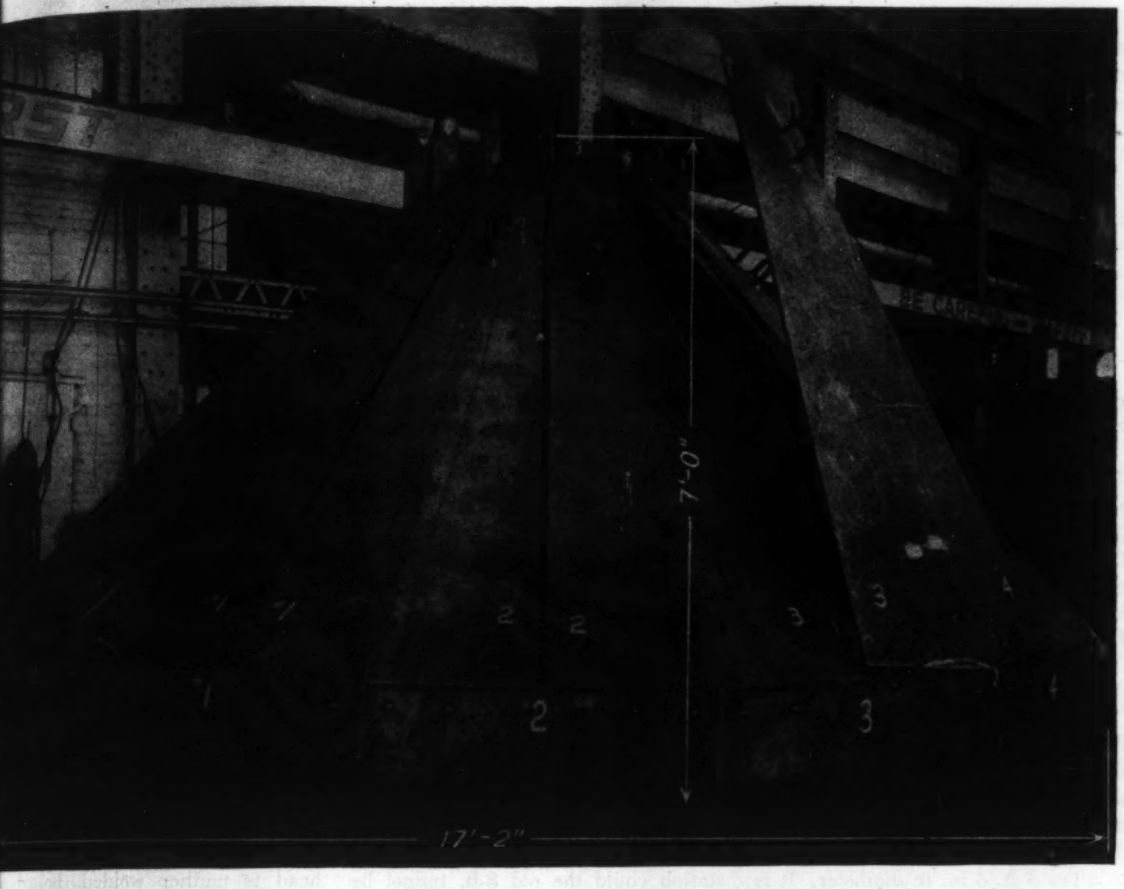
The bulk of this postwar housing—10 projects—now is concentrated in New York City with the other five in Elmira, New Rochelle, Port Chester, Yonkers and Utica. Preliminary plans for 4,920 additional postwar dwelling units are under consideration for Freeport, Rockville Center, Tarrytown and New York City. According to the association, New York is the only state with a postwar housing program set up and ready to go as soon as materials and manpower are available.

Permanent housing, completed or under construction for 4,884 war-worker families in Niagara Falls, North Tonawanda, Tonawanda, Schenectady, Elmira, Brooklyn and Utica, will accommodate families in low income groups after the war. State and city subsidies will assure low rentals for these units, as well as for the other postwar projects already mentioned.

No suggested or approved layouts are included in development standards set up by the housing division. Local architects are encouraged to work out site and unit plans according to needs and habits of families living in communities where projects are to be built. In every instance in the program, local architects were employed, resulting in wide variance in site and unit plans. However, all meet minimum standards on room size, coverage and density, accessibility to community facilities, etc.

Unit plans submitted for review must show furniture, radiation, exposed pipes, electric outlets and door swings. To guarantee a minimum amount of furniture, spaced to permit adequate movement, the division specifies basic furniture requirements, room by room.

New York authorized in 1938 a $300,000,000 debt for state loans and subsidies for low-renting housing projects. A law passed by legislatur the next year enabled the state t borrow half the total amount. Two thirds of this $150,000,000 was authorized for allocation to New Yor City, with the balance reserved fo the rest of the state. A new bill passe this spring authorizes an addition $35,000,000 out of the $150,000,00 for public housing in New York Cit thus changing the former ratio. Ne York State's provision for slum clea ance and construction of low-re housing is, the association says, th only one in the country.



g. 1. Construction of a deep water tunnel in Chicago required an all-steel removable bulkhead of unusual design.

Removable Bulkhead For Water Tunnel

***ontents in Brief**—An all-steel removable bulkhead, installed 116 ft. below ound in a vertical shaft, protects a 13-ft. tunnel under construction from ter flowing through an existing 8-ft. tunnel immediately overhead. Cables tached to the bulkhead's 31 component parts and extending to the top of shaft will permit removal of the bulkhead piece by piece after the new nnel has been completed.*

ENGINEERING PROBLEM of unusual oportions was solved recently by icago waterworks engineers in mak- g the connection between a new ft. clearwater tunnel from the South strict filtration plant and an exist- g 8-ft. tunnel from the Dunne Crib pplying the 68th Street pumping tion.

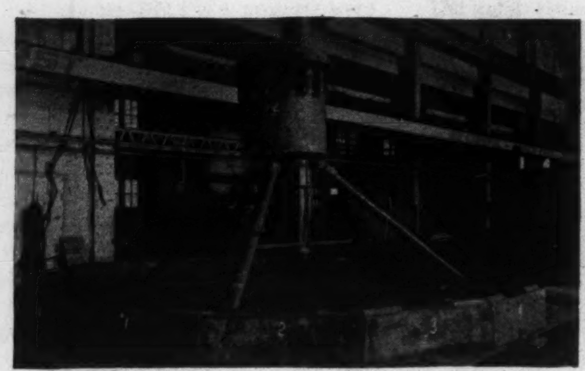
Success of the operation hinged on installation and subsequent re- val of a large steel bulkhead in- lled 116 ft. below ground. The ef problem was to design, fabricate and install the bulkhead so it would be reasonably watertight with provisions made for the removal of its 31 component parts after it had served its purpose.

Reduced wintertime pumping requirements of the 68th Street station permitted the 8-ft. supply tunnel to be taken out of service while making the connection. During this period sufficient raw water was furnished the plant through its intake line from the 68th St. Crib to operate three of its five pumps for an output of 120 mgd.

Installation of the bulkhead, however, had to be completed by June 1, since the summertime demand of 160 mgd. on the 68th Street station required both of its intake tunnels to be in full operation by that time. Carefully planned and well executed construction procedure resulted in the bulkhead being installed and sealed, and the old tunnel put back in operation just in time for the summer pumping season.

Installed at old work shaft

An existing 10-ft. dia. vertical shaft from the ground surface to the old water tunnel was the logical location for making the connection. The old tunnel connects into this vertical shaft at two elevations: at El.—97.7 on the lake side and at El.—37.3 on the side toward the 68th Street pumping plant.



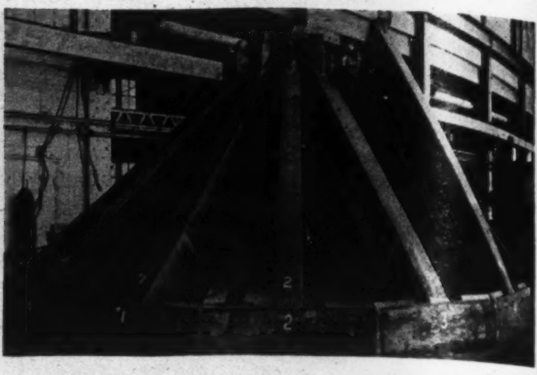


Fig. 2. Pivotal legs for the bulkhead core (left) bear against the base ring. Old steel beam ribs (right) bear against the base ring while their tops are held in slots on the central drum.

The bottom of the new tunnel at the vertical shaft is at El.—132.7 which provided ample space for installing the bulkhead between the top of the new tunnel and the bottom of the lower section of old tunnel. (see Fig. 5).

Shaped like a cone

When completely installed in a flared extension of the vertical shaft the removable bulkhead resembles a segment of a cone, although in reality it is a 15-sided figure having a base diameter 17 ft. 2 in. and sloping up to a top 3 ft. 8 in. in diameter. It is 7 ft. high. The sole function of the bulkhead is to prevent water flowing overhead through the old 8-ft. tunnels from entering the uncompleted new tunnel leading to the filtration plant.

The bulkhead will not be removed for several months, during which time mining of the new tunnel will be completed and it will be lined, sterilized and subjected to numerous operational tests before being placed in service.

Piecemeal removal adopted

At no time during the full-capacity operation of the 68th Street pumping station could the old 8-ft. tunnel be taken out of service long enough to remove the bulkhead. Neither would it be possible for a diver to descend in the shaft to remove the bulkhead while the old tunnel is operating as he would be working 116 ft. below ground and under a 110-ft. head of swiftly moving water.

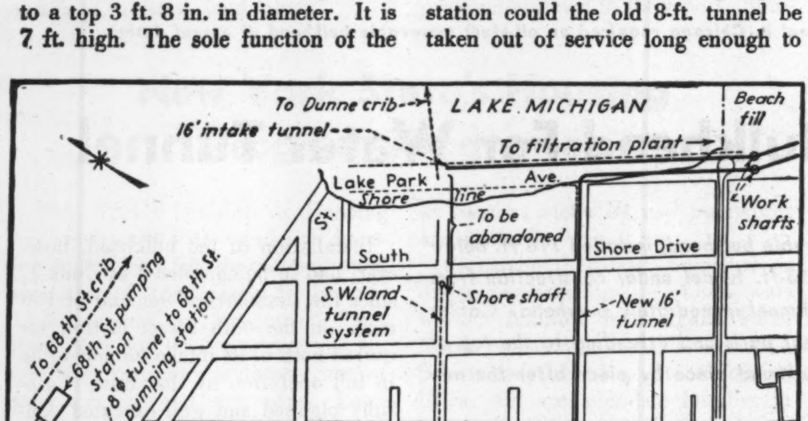

To Dunne crib
LAKE MICHIGAN
Beach fill
16' intake tunnel
To filtration plant
Lake Park
Ave.
Shore
line
To be abandoned
Work shafts
St.
South
Shore Drive
S. W. land tunnel system
Shore shaft
New 16' tunnel
To 68th St. crib
68th St. pumping station
8'ϕ tunnel to 68th St. pumping station
Exchange
St.
Yates
St.
St.
Ave.
69th
71 St
Oglesby
St.
14' tunnel
72nd
6'ϕ gate
9' tunnel
6'ϕ gate 13 dia.
Ave.
73rd
74th
Ave.
Temporary concrete bulkhead
Removable bulkhead in present work shaft
To Roseland and Western Ave. pumping stations
12' tunnel
16'ϕ gate shaft
13' stub
New tunnel mined from this point to filtration plant

Fig. 3. When completed, the new 13-ft. tunnel will serve the 68th Street pumping station as well as supplying the 73rd St. tunnel, now served by Dunne Crib. Connecting the Dunne Crib line to the 16-ft. intake tunnel can not be completed until the South District filtration plant is in operation.

Faced with these grim realities, the waterworks engineers conceived, designed, fabricated and installed the removable steel bulkheads, the chief requirement being that it could be removed at the proper time by workmen at ground level.

To insure its easy removal the bulkhead is neither welded, bolted nor riveted as a single unit. Considerable welding was employed, however, in fabricating the component parts. It is made up of 31 segments, each attached to a 115-ft. length of $\frac{3}{4}$-in. steel cable running to ground surface. No new steel was needed. All steel beams, plates, angles and hoisting cable were taken from the city's stock of used materials.

First step in preparing for the installation of the bulkhead included sealing of the old tunnel with a 4-ft. thick concrete bulkhead a short distance north of the work shaft after a control gate in the tunnel on the south side of the shaft was closed and the intervening section of tunnel dewatered.

The vertical work shaft was extended down to the bottom of the new tunnel and the tunnel proper was mined and lined for a short distance away from the shaft. The concrete-lined shaft was flared out to a 17-ft. 2-in. dia. at El.—111.5 and shaped to permit easy erection and removal of the bulkhead to be installed at that elevation.

While the shaft was being prepared

receive the bulkhead the city's ops were busy fabricating the all-eel assembly. No great amount of recision fabrication was necessary, ut, to be sure of its functioning, it as completely assembled in the shop d all parts matchmarked to insure roper erection and easy removal. It as then dismantled in the exact man- er that will be followed at a later date fter it has served its purpose.

The bulkhead contains 31 remov-ble parts; a central drum supported three pivotal legs, 15 sections of eel beams forming the ribs, and 15 over plates which make up the shell. n all-welded 15-sided base ring, fab-icated in four pieces and installed in e recessed section of the work shaft support the bulkhead, will not be emoved.

The central drum, formed of ¾-in. eet steel, is 3 ft. in dia. and 3½ ft. igh. It serves as the core of the bulk-ead, forming a bearing for the upper ds of the steel-beam ribs. Short eces of bars, welded in pairs to the tside of the drum near its top, form ots to hold the upper ends of the ribs place.

Three 3-in. dia. extra strength pipe gs are pin connected to lug angles elded to the bottom of the drum. hile installing the ribs, the legs sup-ort the drum at a point about 6 in. bove its final location by temporary ocks between the ends of legs and in-de of base rings. After all ribs have en erected in bearing against the wer portion of the drum, the tem-rary blocks are removed and the gs spread out until they bear against e base ring. This operation lowers e drum sufficiently, while the webs the upper ends of the ribs slide in e prepared slots, until the angle at e top of the drum rests on the ends the ribs and locks them securely in ace.

A short section of 6x6x⅜-in. angle lded to the bottom of each leg acts a shoe and bears against the base g. The pulling cable for the drum attached to two steel plates located its center and extending the full pth of the drum where they are lded to the bottom plate.

Old steel beams for ribs

Old 24-in. steel I-beams form the ribs. Both ends were cut on a 45-g. bevel. At the upper end the top nge was coped to permit the web to slide easily into the drum slots. At the lower end the top flange and a portion of the web was cut at 90 deg. to the previously beveled cut and 1-in. steel plates were welded to the end of the web to form a shoe which bears against both the bottom and the vertical legs of the base ring. Guide angles, welded on the bottom leg of the base ring, insured each strut being erected in proper position. They also hold the ribs securely in place. Hoisting cables are attached to a 1-in. plate welded to the upper end of each rib.

The 15 cover plates forming the outside shell of the bulkhead required careful fabrication. Due to the 15-sided shape of the completed bulkhead they had to be bent slightly on their centerlines and at the same time all edges had to be kept straight to insure proper bearing on the supporting ribs.

Cover Plates Stiffened

Cover plates span from rib to rib. Their edges were not milled to furnish a watertight closure, in fact, a 1-in. opening was left between plates, over the centerline of each rib. After the plates were assembled in place these openings were filled with mastic and overlaid with 8-in. wide strips of tarred fabric. Plate stiffeners, welded underneath the cover plates, prevent their buckling under the 110-ft. head of water which they must carry. Ends of cover plates are beveled 45 deg. to fit snug both top and bottom and the joints are filled with mastic. A looped rod welded to each coverplate near its upper end is cable-attached for removing the plate.

After the bulkhead was completely installed the central drum was filled with concrete to give added stability and to resist any possible hydrostatic pressure when the old 8-ft. tunnel above the bulkhead is put back into service.

The bulkhead is now in place and functioning properly. It will be removed sometime this year after the new tunnel connecting the workshaft to the filtration plant has been completed and tested, and after construction of the filtration plant has reached a point where it can serve the tunnel.

Sequence of removal

When that time arrives the new tunnel will be filled with water from the filtration plant and a head built up against the bottom of the bulkhead equal to the water pressure from above. A 4-in. steel pipe airline in the shaft will agitate any sand or silt deposited on the bulkhead. With the water pressure equalized on both sides of the bulkhead, it will be removed piece by piece, by withdrawing the 31 cables leading to ground level at the top of the shaft.

The 15 coverplates will be removed first, starting with any one plate and

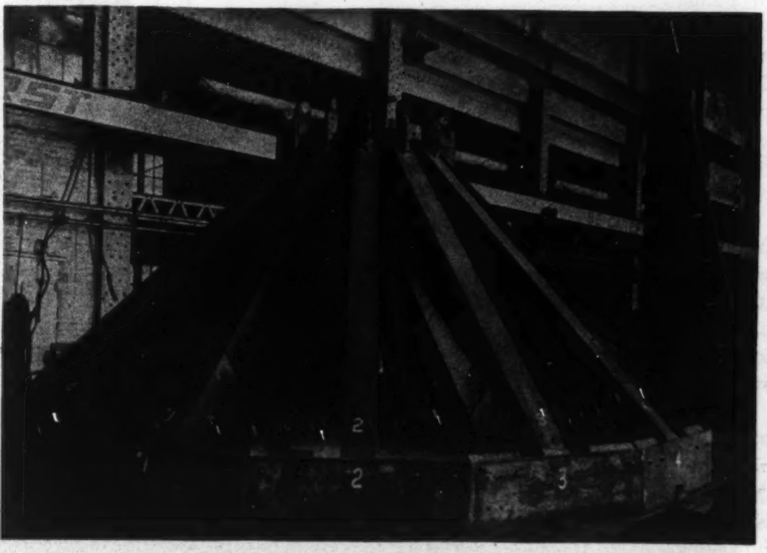


Fig. 4. Proper erection and easy removal were insured by shop assembling the complete bulkhead. Each cover plate, rib beam, and the central drum has its own hoisting cable.

progressing around the periphery of the bulkhead. Next, the central drum will be raised slightly to disengage the steel-beam ribs from the slots formed on the outside of the drum. With the ribs swung clear, they will be removed in the proper sequence, and lastly, the drum will be pulled up out of the shaft. At this point, the new tunnel will take over supply water to the 68th Street, the Roseland, and the Western Ave. pumping stations, formerly served direct from Dunne Crib.

Dunne Crib, however, will continue in service to supply raw water to the filtration plant now nearing completion near 79th St. and Lake Michigan. No connection can be made at 73rd St. and Lake Park Avenue (see Fig. 3) between the raw water intake tunnel and the Dunne Crib intake line until the filtration plant is operating to supply its 16-ft. outlet tunnel. However, when this connection is made, the section of the 73rd St. tunnel between Lake Park Avenue and South Shore Drive will be bulkheaded and taken out of service.

South side supply system

How the new 16-ft. tunnel will serve the city's south side pumping plants is of more than passing interest. With the bulkhead safely removed from the work shaft in Oglesby Ave., water from the new tunnel will rise up into the shaft and flow out in two directions—north to the 68th Street plant and south to the existing 73rd St. tunnel.

At the same time the 9-ft. tunnel in Yates Ave. will be feeding into the 73rd St. tunnel. A 6-ft. gate in this tunnel, together with the existing 6-ft. gate in the Oglesby Ave. tunnel, will furnish full capacity to the 12-ft. tunnel below 73rd Street.

The 100-ft. long, 13-ft. dia. stub tunnel near 74th St. and Yates Ave. was completed as a part of the main tunnel contract. It will be extended under 74th St. sometime in the future to serve the South West land tunnel system.

Although this huge bulkhead was put to a severe test to seal off water under a 110-ft. head from entering the new tunnel, it is functioning satisfactorily. Furthermore, the successful removal of its 31 component parts located deep beneath the ground is subject to certain risks. But it was fabricated so carefully and its removal has been rehearsed in such meticulous detail that the Chicago engineers have every confidence in the success of the operation.

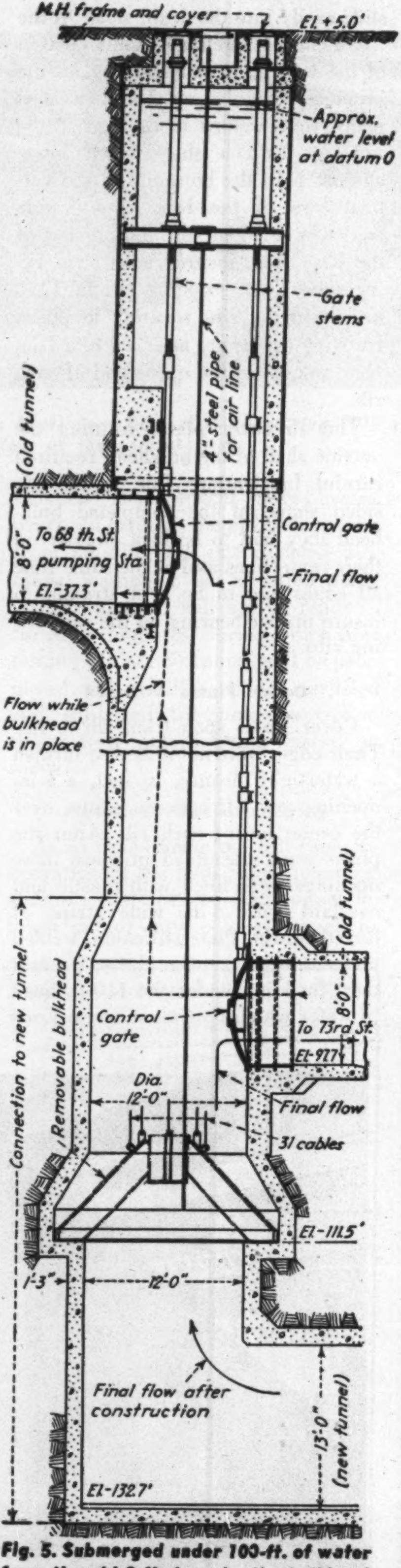


Fig. 5. Submerged under 100-ft. of water from the old 8-ft. tunnels, the bulkhead protects the new tunnel now under construction. Cables extending to ground level will remove the bulkhead after the new tunnel is completed.

All work in connection with the design, fabrication, installation and subsequent removal of the bulkhead is under the supervision of W. W. DeBerard, city engineer of Chicago, reporting to Oscar E. Hewitt, commissioner of public works. John S. Dean, engineer of waterworks construction, is in direct charge of the work and A. G. Anderson is project engineer in charge of tunnels. Arthur V. Schultz is resident engineer on construction. Wm. Casati, reporting to John R. Baylis, engineer of water purification, designed the bulkhead.

Metal Lath Manual Revised For Simplification

A revision of *Simplified Practice Recommendation R3-41, Metal Lath (Expanded and Sheet)*, has been approved for promulgation, according to an announcement of the Division of Simplified Practice, National Bureau of Standards. It will be identified as *R3-44* and the title will be changed to *Metal Lath (Expanded and Sheet) and Metal Plastering Accessories.*

This revision further simplifies the types, weight and sizes of items in the issue which it supersedes, and broadens the coverage of the recommendation to include bullnose corner bead, corner lath, strip lath, base screeds, metal casings, concealed picture mould, tie wire, hanger wire, and metal studs for hollow partitions. This places all metal plastering accessories within the scope of the recommendation and explains the change in title as mentioned above.

Use of the critical materials needed in the production of the commodities covered by *R3-44* is now restricted b War Production Board order. The new recommendation will, therefore become effective when the critical materials become available for this purpose.

Until printed copies are availabl from the Superintendent of Documents, Government Printing Office, limited supply of free mimeographe copies may be obtained by applyin to the Division of Simplified Practice, National Bureau of Standards Washington 25, D. C.

A Combination of Surveying Methods is Best

Paul Van Buskirk
The Huron-Clinton Metropolitan Authority, Detroit, Mich.

OGRAPHIC SURVEYING should ben- from the discussion that M. F. ault started so well in his article ne Table Versus Transit for Top- phic Mapping," in *Engineering s-Record* May 4, 1944, p. 680.

re is too little use of stadia, para- cally due to its advocates, who are inually laying too much stress on shots; the "long shot" field now ngs to the photographic mapping le. Graphic methods are used too and too many jobs are cross sec- ed, because it is "simple," al- gh the "breaks" are seldom taken less often plotted correctly.

ew surveymen know that a sturdy lar stadia slide rule can be had one dollar. The tape rod is re- d because it is not "accurate," by same man who uses his H.I. to nearest tenth of a foot and reads side shots the same way. In a lar way too much attention is n to the trivial *f* plus *c* correction, h does not show when plotted, is best taken care of by advanc- the index hair a hundredth when g a reading.

pecifically, the author wishes to to the discussion of the Baltimore Shirley method of topographic ping, which has been revived and oved. This method is now used ly in the Detroit district, even by nizations owning plane tables. ations in this procedure have n that a combination of methods st for topographic work.

gineers of one large local organization use their plane table as a drawing board only, depending 10-in. dia. celluloid protractor graduated cross bar for plotting it shots. The protractor is piv- at the station, another needle is ted against its edge on the dian and shots are plotted as reduction being by a circular slide rule. Ordinary Philadelphia or Frisco rods are used, long shots being avoided. Station elevations are established, the rod reading at the instrument determined and all shots taken as inclined sights on that reading. The usual scale is 100 ft. per inch.

We depend on the transit for all our topography, but use some unique equipment for determining elevations and for field plotting shots. We field draw all our work on the newly developed white pencil tracing cloth, which is almost waterproof, using very hard pencils for accuracy of line and to prevent smudging. The drawing table is made from a stock 20 x 26-in. board, having a built-in white celluloid protractor, the 10-in. center circle being free to revolve and having one radius graduated carefully to the required scale (Fig. 1).

The control stations are plotted on the sheet, a meridian line being drawn near the middle and the known data added. The plotted position of the occupied station is centered carefully on the disk and the sheet is oriented by bringing its meridian line parallel to the board meridian. As the transitman calls the azimuth, the topographer revolves his scale to that reading, plots the distance as it is given him, then inserts the proper elevation figures. Great precision can be attained in plotting shots by this method. The white celluloid background makes it possible to bear down on the pencil and get opaque contour lines, which will yield blueprints direct. Moreover, the lines will not smudge, and so make a good permanent record.

At each new set-up the sheet must be moved, but orientation is kept accurate by always scaling from the sheet meridian. While mapping sections on which only the exterior and quarter lines were run as control, we often traverse seven or eight stations

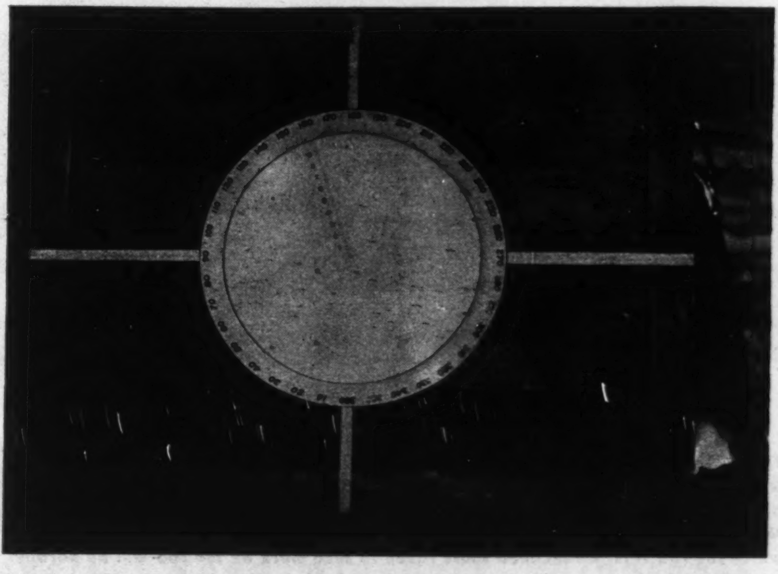


Fig. 1. Topographic mappers in Detroit area use a 20x26-in. drawing table with built-in celluloid protractor.

and close back into our control with an error of about 0.05 in. when working on a 200 scale.

Rapid plotting possible

Plotting is so rapid by this method that one rodman can not keep up, while two rodmen put the transitman behind with his elevation reductions. This bottleneck was broken by using tape rods of the type shown in Fig. 2, which permitted the bubble-level elevations to be read directly and made the reductions of inclined shots an easy mental subtraction, as illustrated graphically in Fig. 3.

The ease with which shots may be reduced and plotted makes for much better field work. With the board mounted on a tripod and approximately oriented near the transit, errors in azimuth and distance readings are at once detected by the topographer. In bad weather the topo-table can be operated inside a car if it is possible to drive within hearing distance of the transitman. Good speed can be made with two regular rods, if the transitman knows the visual method of counting above or below his datum rod reading and if he sets the center hair of the instrument on the datum rod reading for inclined shots.

By the method just outlined the field checking advantage of the plane table method is utilized, with the greater strength of the transit readings. Locations by intersecting angles can be made, and resection and three point location can be done by using an extra sheet. The equipment works well on 200-ft. scale jobs, as a quarter section can be done on one sheet. Only 40 acres can be done to a sheet at 100 ft. scale, but for strip work 3,000 ft. may be done on a rolled sheet.

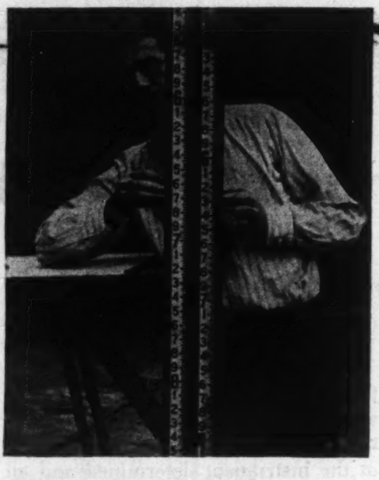


Fig. 2. Surveyors may increase their speed by use of tape rods of this type.

A variation of the method outlined was devised for 50-ft. scale work b Maurice Baldwin of our staff. He us the tracing cloth on a plane tabl slips a 14-in. dia. cardboard protra tor under it, centers and orients, the scales on the top with a white edge scale pivoted by needle point at th station. This permits much large sheets to be used in the field. Succes ful use of the method requires th the center point of the protractor b marked with a small circle and cov ered with thin celluloid, to preve the needle hole from becoming ina curate.

To summarize, no one method satisfactory for all surveying job The engineer should select the be method or combination of method for the work in hand. But field dra ing of details is one item that shou be included in any method selecte

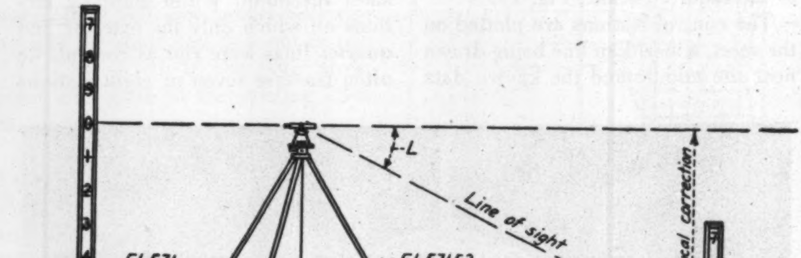


Fig. 3. Use of tape rods makes reduction of inclined shots an easy mental subtraction. Procedure is as follows: Set the rod on a stake of known elevation and move the tape until that reading comes to the level line of sight, then clamp the tape. All bubble-level shots now give the last three figures of elevation on which the rod sets. All inclined shots taken to zero mark on the rod will be parallel to a line from bottom of rod to a point below the instrument in the 10-ft. datum plane; hence vertical corrections can be made directly to 10-ft. datum.

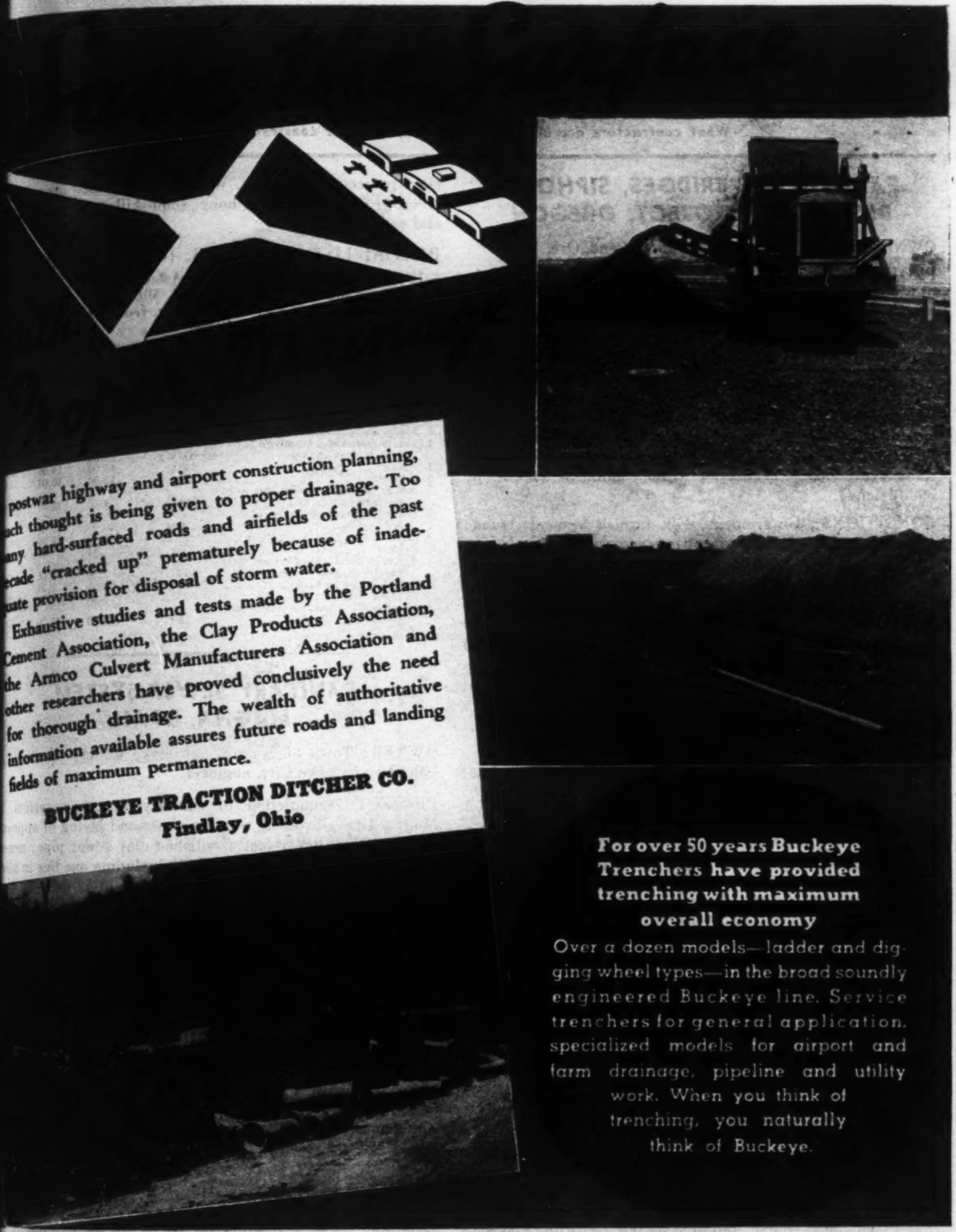
Irrigation Projects to Transform Brazilian Are

A drought area of more th 260,000 square miles in the Brazili states of Maranhao, Piaui and Cea is soon to be converted into a fertil productive region by irrigation pr jects nearing completion in the Sou American republic.

A group of technicians cooperati with experts of the Commiss Brasileiro-Americana has assisted bringing the projects to completio The Brazilian government has verted more than 1,600,000 acre-f of reservoir water into the area d ing the past ten years, and the wo of irrigation is being intensified keep pace with Brazil's growing e nomic requirements.

A big dam, with a storage capa of 584,000 acre-ft., is being finis at Curema and is expected to deve hydroelectric power of a 2,000 output. Besides irrigation ditches dams, a large network of roads being built ir the region to prov adequate transportation.

The work is being done by Fomento Vegetal, a division of Brazilian Ministry of Agricult with the joint cooperation of the stitute of Inter-American Affairs the Commissao Brasileiro-America Additional irrigation and hydroe tric projects planned by the Brazil Government include tapping the Francisco River for a hydro-e tric output estimated at 750,000



postwar highway and airport construction planning, ich thought is being given to proper drainage. Too any hard-surfaced roads and airfields of the past ecade "cracked up" prematurely because of inadeuate provision for disposal of storm water.

Exhaustive studies and tests made by the Portland Cement Association, the Clay Products Association, the Armco Culvert Manufacturers Association and other researchers have proved conclusively the need for thorough drainage. The wealth of authoritative information available assures future roads and landing fields of maximum permanence.

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

For over 50 years Buckeye Trenchers have provided trenching with maximum overall economy

Over a dozen models—ladder and digging wheel types—in the broad soundly engineered Buckeye line. Service trenchers for general application, specialized models for airport and farm drainage, pipeline and utility work. When you think of trenching, you naturally think of Buckeye.

Built by Buckeye

Convertible Shovels   Road Wideners   Trenchers
Spreaders   R-B Power Finegraders   Tractor Equipment

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

EARTHWORK, BRIDGES, SIPHONS DESCHUTES PROJECT, OREGON

OWNER: U. S. Bureau of Reclamation, Bend, Ore.

PROJECT: Earthwork, structures, construction to two highway bridges, reinforced concrete siphons under City of Prineville Railway and in Sherwood Canyon, along North Unit Main Canal, Deschutes Project, near Redmond and Terrebonne, Ore. Reinforced bridges constructed on concrete piers extending to solid rock; bridge deck of beam and slab construction; roadway width 26-ft.; total length of each bridge 48-ft., divided into two spans of 24-ft. each. Siphons consist of inlet structure, outlet structure, and conduit (City of Prineville Railway siphon includes two 7-ft. square conduits 77-ft. long; Sherwood Canyon conduit is 11½-ft. by 392-ft. long).

CONDITIONS: Government will furnish cement; sand; coarse aggregate; reinforcement bars; expansion metalwork; sluice gate, stem and guides; ladder rungs, drainhole pipes; permanent structural timber; anchor bolts, washers; paint and coating materials; and all other materials that will become part of completed structure. Contractor to furnish all other materials and complete work in 200 calendar days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.35 to $2.00 per hour; common labor, 95c.; semi-skilled labor, 90c to $1.50.

PARTIAL LIST OF BIDDERS:

1. McLaughlin Constr. Co., Pocatello, Idaho (low bidder)	$58,881
2. David A. Richardson, Santa Cruz, Cal	60,397
3. Scheumann & Johnson, Seattle, Wash	74,756

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation, common	10,300 c. y.	$0.30	$1.70	$1.00
2. Excavation, rock	1,400 c. y.	4.00	1.70	3.00
3. Backfill	9,200 c. y.	.20	.20	.40
4. Compacting backfill	1,600 c. y.	.75	.70	1.00
5. Riprap	850 c. y.	3.50	2.50	4.00
6. Concrete	1,208 c. y.	28.00	25.00	35.00
7. Place reinforcing bars	210,000 lb.	.0375	.02	.03
8. Place elastic joint-filler material	20 s. f.	.50	1.00	2.00
9. Place metal water stops in joints	3,160 lb.	.13	.08	.10
10. Drill 6-in. drainage hole	40 l. f.	12.00	7.00	10.00
11. Install blow-off valve and connections	1,200 lb.	.11	.05	.10
12. Install miscellaneous metalwork	1,200 lb.	.12	.06	.10
13. Temporary construction to permit building of C. of P. Ry. siphon	Lump Sum	1,300.00	400.00	2,000.00

TAXIWAYS, ZANESVILLE, OHIO

OWNER: Civil Aeronautics Administration, Chicago, Ill.

PROJECT: Construction of two 75-ft. wide taxiways for the Zanesville, Ohio, Municipal Airport. Involves paving of taxiways, aprons and concrete pavement with 90,600 square yards of Class A concrete; 91,650 square yards of 5-in. granular sub-base blanket course; required liming, fertilizing and seeding; necessary 3-in. cable ducts encased in concrete (including concrete markers) in one, two and four duct banks. Alternates were allowed for concrete paving or for crushed aggregate bituminous surface course. Award made on basis of concrete pavement.

CONDITIONS: Contractor to furnish all materials and complete work in 45 days. Rail and highway transportation facilities available. Other work is being carried on by construction contractors and it is necessary for contractor on this schedule to cross over work now in progress or completed. Contractor should hold these crossings to a minimum consistent with efficient prosecution of work. Wage rates specified are: skilled labor, $1.15 to $1.625 per hour; semi-skilled, 90c. to $1.125; and common, 72½c.

PARTIAL LIST OF BIDDERS: (Concrete paving)

1. Lewis & Frisinger Co., Ann Arbor, Mich.; E. B. Schwaderer & Co., Cass City, Mich.; and Julius Porath & Sons Co., Detroit, Mich. (contract)	$292,521
2. Pierce Construction Co., Toledo, Ohio	297,18
3. Launder & Son, Inc., Toledo, Ohio	302,3

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Grading	17,000 c. y.	$0.30	$0.50	$0.
2. Repairing washes	500 c. y.	1.00	1.00	1.
3. 5-in. granular sub-base blanket crse	91,650 s. y.	.32	.30	.
4. 9-in. uniform Class A concrete pavement, taxiway and apron	90,600 s. y.	2.50	2.58	2.
5. Liming	230 ac.	10.00	10.00	20.
6. Fertilizing	230 ac.	12.00	10.00	20.
7. Seeding field and sideslope area with winter rye	150 ac.	8.00	12.00	15.
8. Seeding field and sideslope areas with seed mixture	230 ac.	20.00	30.00	20.
9. Straw mulch	20 ac.	200.00	125.00	100.
10. Sodding	30,000 s. y.	.42	.30	.
11. 3-in. cable ducts encased in conc., incl. concrete markers (1 duct bank)	160 l. f.	1.50	1.00	1.
12. As above (two duct bank)	1,050 l. f.	2.25	1.20	1.
13. As above (four duct bank)	80 l. f.	3.50	2.50	3.
14. Concrete, 1:2:4 mix, for erosion protection, etc	15 c. y.	50.00	35.00	40.

SANITARY SEWER SYSTEM MAGNA, UTAH

OWNER: Town of Magna, Salt Lake County, Utah. C. J. Ullrich, Salt Lake City, engineer.

PROJECT: Completion of sanitary sewerage system in Magna, Utah, involving the furnishing and laying of approximately 49,000 linear feet of vitrified clay sewer pipe; necessary trench excavation and backfill, including one line in alley that is 9 to 12-ft. wide in which pipe is laid 12 to 16-ft. deep in hand-excavated trench.

CONDITIONS: Contractor to furnish all materials and complete work in 175 working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.50 per hour; semi-skilled, $1.00 to $1.10; and common, 75c. Project originally started in 1941 as WPA project. Disposal unit is completed and half of sewer system already in.

PARTIAL LIST OF BIDDERS:

1. Enoch Smith Sons Co., Salt Lake City, Utah (contract)	$122,2
2. Stroud-Seabrook, Layton, Utah	134,21
3. Wheeler & Tempest, Salt Lake City, Utah	157,77

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Field office	Lump sum	$500.00	$300.00	$400.
2. Sewer trench excav. and bkfill	28,100 c. y.	1.40	1.20	1.
3. Spec. sewer trench excav. and bkfill	2,400 c. y.	3.00	5.00	3.
4. Service lateral excav. and bkfill	7,500 c. y.	2.00	2.50	1.
5. 15-in. vitrified clay sewer pipe	300 l. f.	2.00	1.75	3.
6. 12-in. vitrified clay sewer pipe	1,100 l. f.	1.40	1.30	3.
7. 10-in. vitrified clay sewer pipe	3,550 l. f.	1.10	1.10	1.
8. 8-in. vitrified clay sewer pipe	26,005 l. f.	.90	.80	1.
9. 4-in. vitrified clay sewer pipe	17,000 l. f.	.50	.50	2.
10. 15x4-in. vitrified clay wyes	7 ea.	10.00	9.00	8.
11. 12x4-in. vitrified clay wyes	25 ea.	6.00	8.00	12.
12. 10x4-in. vitrified clay wyes	159 ea.	5.00	7.00	7.
13. 8x4-in. vitrified clay wyes	930 ea.	3.00	6.00	4.
14. 8x6-in. vitrified clay wyes	5 ea.	3.00	6.00	4.
15. 4-in. 45-deg. vitr. clay ells	1,111 ea.	1.50	1.20	3.
16. Gravel fill for trench bottom	500 c. y.	2.00	1.50	1.
17. 2x8-in. plank for pipe support	5,000 ft. b.m.	.10	.05	
18. Conc. manhole, c.i. cover and ring	84 ea.	150.00	250.00	140.
19. Conc. flush tank, c.i. cover and ring	9 ea.	200.00	300.00	227.
20. Conc. manhole per ft. over 10′ deep	30 l. f.	15.00	15.00	11.
21. 8-in. cast iron pipe, under RR track	96 l. f.	3.00	6.00	3.
22. 10-in. cast iron pipe, under RR track	32 l. f.	5.00	7.00	4.

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nong the fighting craft powered by erling engines are the 104-foot offshore cue boats of the U. S. Army Air Forces.

e to the urgency of war, we are build- engines for the allied navies, armies U. S. Coast Guard, which, in design construction, are a generation ahead their time. Engines that develop greater rsepower per pound of weight than ever fore—that are more economical to oper- —that give long months of dependable vice—before even needing an overhaul.

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EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

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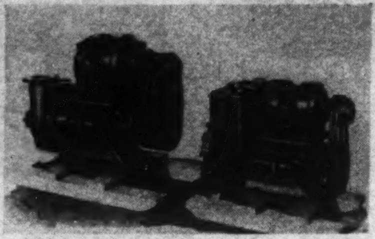
NEW AIDS TO THE CONSTRUCTOR

Centrifugal Pumps With Overhead Motor

More accurate speeds are possible, it is stated, with a new Amsco-Nagle overhead motor centrifugal pump. In addition, the motor is more accessible, and is protected against flooding.



The manufacturer's Type "A" and Type "T" horizontal pumps are available with overhead motor mounting.—*American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill.*

• • •

18-in. Pneumatic Saw

Built on the same principle as a crosscut saw, and usable above or under water, the new Davey 18-in. pneumatic saw, operating at a speed of 225 strokes per minute, will cut an 18-in. timber in less than a minute, the manufacturer asserts.

An easily adjusted clamping device supports the saw's weight, and is said to prevent arm-jerking jolts and uneven cuts. Simplicity of design permits efficient saw operation and maintenance even inexperienced workers.—*Davey Compressor Co., Kent, Ohio.*

• • •

Hydraulic Dredge

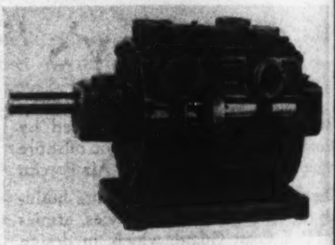
Fully equipped to operate in isolated locations for long periods, a new 12-in. hydraulic dredge is of compact design. It will handle sand, clay and silt to a depth of 16 ft. and deliver the material through a maximum of 1,000 ft. of discharge line at water level, or 500 ft. of line at 30-ft. elevation.

The main dredging pump has a 14-in. suction pipe and a 12-in. discharge pipe; it is powered by an 8-cylinder, 320 hp. diesel engine. The prefabricated steel hull measures 104 ft. x 29 ft. x 6 in., enabling the complete dredge to be shipped on standard railroad cars or in cargo holds. A 36-ft. digging ladder is provided, with an overload margin. Interchangeable cutter heads meet varying character of materials encountered on different projects.—*American Steel Dredge Co., Fort Wayne, Ind.*

• • •

Rotary Air Pumps

Compact but combining the advantages of two separate single-cylinder pumps, a new two-cylinder rotary pump may be used for air pressures up to about 50 lb. per sq. in., and for vacuum up to about 28.7 in. mercury.



This machine is made in several sizes, and is said to be smooth and quiet in operation. One pump cylinder may be used for pressure while the other is used for vacuum; or both may be used for pressure or for vacuum.—*Leiman Bros., Inc., 115-74 Christie St., Newark, N. J.*

• • •

Tractor Grip-Lug

Old grouser shoes may be "retreaded" quickly and easily, the manufacturer states, with a new Bulldog tractor grip-lug. Available in two sizes, this device has a specially designed groove and bevel, which permit the weld to grip the retread material firmly.

Of work hardening steel, this lug is said to become harder and tougher with use. It provides efficient traction, and

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n profitably handle both long
hort hauls . . . move more
e with fewer units . . . save
uipment cost and get lower
st per yard.

JOB-PROVED
1800 Built and Shipped

Tournapulls, like all big-capacity scrapers, are designed for pusher loading. They load quickly, haul and spread their own loads, are one-man operated. Because of their large diameter pneumatic tires of large cross section — plus low pressure and greater ground area — Tournapulls operate over concrete without surface damage, travel between jobs under their own power, thus save on freight.

TOURNAPULLS operate from 2.6 to 14.9 m.p.h. — that's 2 to 3 times faster than the fastest tractors. Chart here shows what this greater speed can mean to you in extra yardage.

ONE-WAY HAUL DISTANCE—CU. YDS. PER HOUR*

ctor-drawn Scrapers:	400′	600′	800′	1,000′	2,000′	3,000′	4,000′	5,000′	6,000′
Yd. Capacity	—	—	175	153	97	71	56	46	39
Yd. Capacity	—	187	162	142	89	65	51	—	—
Yd. Capacity	196	163	139	122	74	—	—	—	—
Yd. Capacity	170	142	121	106	65	—	—	—	—
th 15-Yd. Super C Tournapull you get:	200	180	168	156	116	91	76	65	55

*All units pusher loaded on level.

te that even on short hauls — 400 to 1000 feet e-way — Tournapulls compete very favorably h larger tractor-scraper outfits. While on long- hauls — 2000 to 6000 feet — Tournapulls ve from 19% to 41% more than even a 30-yard ctor-scraper outfit — with less first cost and s cost per yard.

Figure 10,000-Hour Profit

an example, take the extra yardage a Tournapull will move over a 10,000-hour working life on a 2000-foot, one-way haul. It varies from 190,000 to 510,000 pay yards, depending on comparative scraper size. *Estimate the profit to yourself on this extra yardage at your own usual bid price!* Can you afford to use more expensive, slower-moving rigs, when this *extra yardage* can be yours with the fast-moving, rubber-tired power of Tournapulls? Figure NOW to use job-proved Tournapulls on your postwar jobs. It will pay you—in first cost, lower cost per yard and greater profit each working hour.

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PEORIA, ILLINOIS — STOCKTON, CALIFORNIA
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UBBER-TIRED POWER FOR FASTER EARTHMOVING

TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.

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FLOORS that SALVAGE LIGHT

Light-Reflecting Floors made with Atlas White cement help make lighting systems more effective

We buy light to make seeing easier; yet much of its effectiveness is wasted by dark colored floors, just as by dark walls and ceilings.

Floors made with Atlas *White* cement, instead of gray cement, salvage light rather than absorb it. This is shown by lighting tests in a large airplane plant where the white cement floor reflected 20% to 60% more light to work areas than did an adjacent gray cement floor.

White concrete floors further promote ease of seeing by reducing the contrast in brightness between work areas and surroundings. They cut down shadows and dark areas and reduce eyestrain—a cause of lowered production, waste and accidents.

Whether in conversion or new construction, light-reflecting floors can help make lighting more effective. Send for the booklet, "Light from Floors," containing test data, cost and recommended installation and maintenance practice. Write: Atlas White Bureau, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

HOW ABOUT MAINTENANCE?

Experience shows white cement floors are easy to clean, easy to keep clean, and retain their reflection advantage. Maintenance is simple—frequent sweeping, occasional damp mopping, periodic scrubbing.

ENR-F-28

ATLAS WHITE CEMENT
For Light-Reflecting Floors

may be applied without having to tear down the assembly.—*Allied Steel Products, Inc., N.B.C. Building, Cleveland, Ohio.*

• • •

Full-Revolving Crane

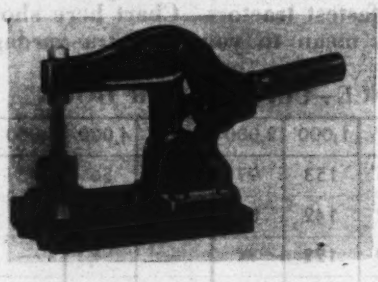
Designed primarily for fast, low-cost load handling, a new Model D full-revolving tractor crane has a lifting capacity (based upon 75 percent of overturning load) ranging from 1,500 to 6,000 lb. Standard boom length is 16 ft.; longer booms and special telescoping and gooseneck designs are available on order.

The unit, with a turning radius of 15 ft. and traveling speeds up to 15 mph., has conveniently located controls. Load stresses are carried by a heavy-duty steel frame bearing directly upon the tractor axles.—*Industrial Equipment Co., 59th and Doyle Sts., Emeryville 8, Calif.*

• • •

Fast Clamp

All dimensions have been held to a minimum in the Cam-O-Lok clamp, the manufacturer announces, which permits its use in limited space. This clamp, in three types for light, medium and heavy duty, is instantly adjustable over the entire range of its vertical holding capacity.



When objects varying in thickness are to be held, clamping pressure is attained without adjusting the hold-down bolt; locking and unlocking are accomplished by a lubricated threaded element in the positioning handle.—*Mechanics Engineering Co., Jackson, Mich.*

• • •

Mimeograph Stencil

A special mimeograph stencil sheet has been announced, for use by both prime and sub-contractors, to produce the 20 or more copies of the War Department inventory schedules usually required for contract termination procedures. This stencil sheet may be obtained with a facsimile of any of the three War Department inventory schedule forms placed on the surface of the stencil sheet.

The facsimile form serves as an exact

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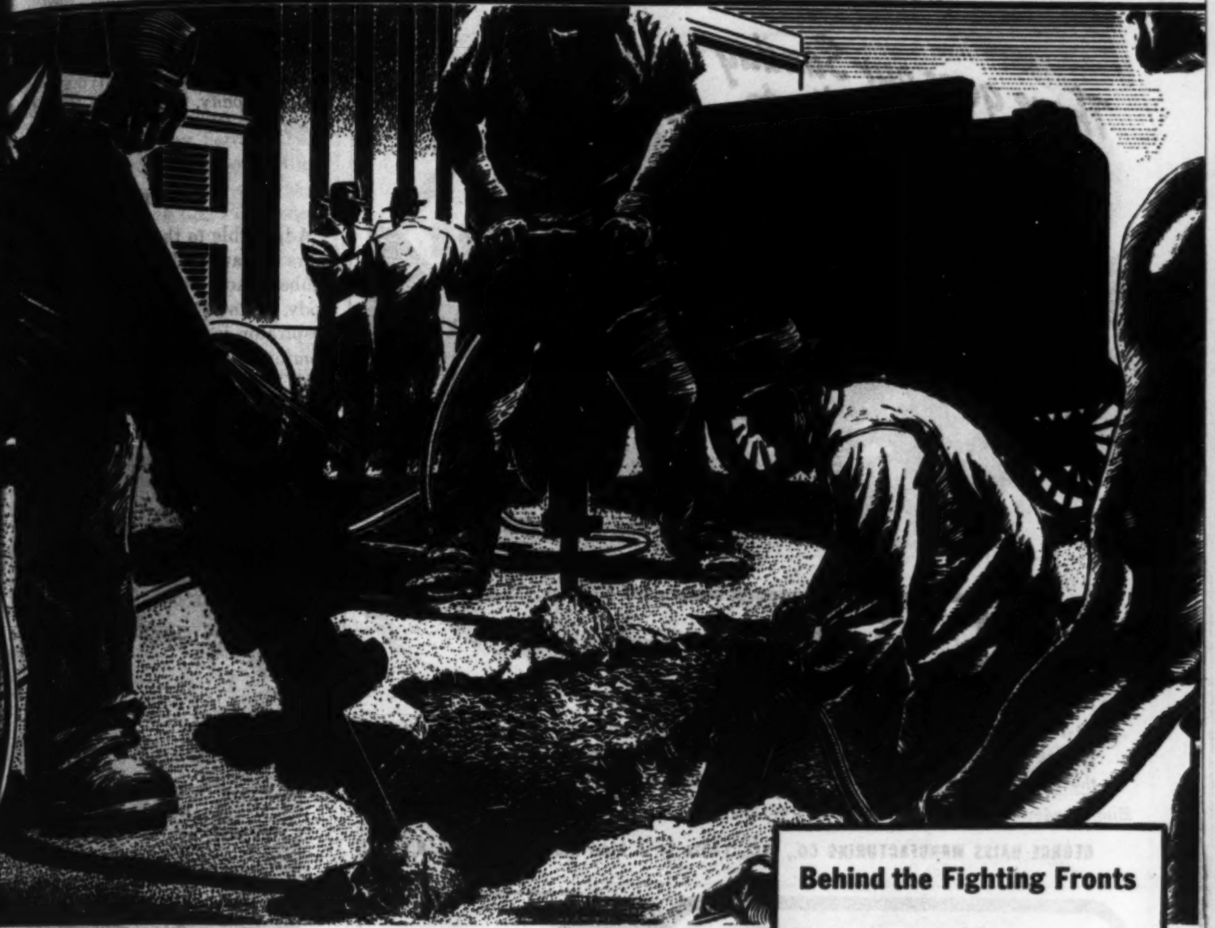

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BLUE BRUTES

Shell-blasted mountain highways in Italy have been repaired with Blue Brute** assistance. In hundreds of war plants here at home . . . Navy Yards, air bases . . . Blue Brutes are at work. Your nearest distributor is listed on page 102.

es now making plans for postwar improvements will be using Blue Brute air r all along the line. You'll find thington compressors and air tools to back your bid on jobs like this: *ilwaukee's 6-year program of imement including a $22,248,093 exditure for new bridges, sewers, dings, street widenings and extens.*

her cities' plans have also gone be the "proposal" stage. New housing ects and streets, involving new ches for gas mains and electric cable g — new bridges and sewers — will orward faster, more economically, with easier-breathing Blue Brute compressors on the job.

Available in all mountings . . . Diesel, gasoline or electric driven . . . Blue Brutes with Feather Valves* stay on the job longer without costly repairs, delays. Full force feed lubrication fights wear; 3-point suspension of engine and compressor cushions shock and vibration. Investigate *all* Blue Brute features now!

Then team 'em up with rugged, easy-handling, air-saving Blue Brute Air Tools . . . like the breakers shown above. You'll have a power team, sturdy and trouble-free for years to come!

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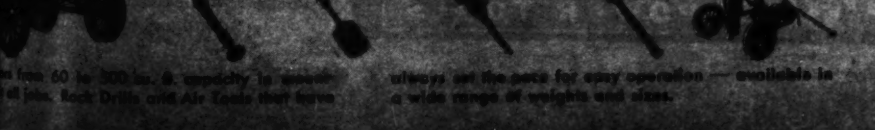

s from 60 to 500 cu. ft. capacity to meet all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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There goes our Sunday dinner... Cruelty to worms, I calls it!

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HI-POWER DIGGING BUCKETS have the lower sheaves non-pocketed, and up and above the counterweight where they and the closing line are out of the muck. For rope economy too, specify HAISS HI-POWER.

Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.

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3 WAYS
to Beat the
Labor Shortage
Mall Portable Power Tools

Immediate delivery on Gasoline Powered wheelbarrow or round base mounted 3 H.P. units, also Gasoline Engine and Pneumatic Chain Saws and most models of Circular MALLSAWS on suitable priority.

Ask your Distributor for MALL Portable Power Tools or write for Catalog.

Tools featured above are the MALL 1½ H.P. Gasoline Powered Concrete Vibrator—also available in 3 H.P. with round base or wheelbarrow mounting—as well as 1½ H.P. Universal Electric and 7500 r.p.m. Pneumatic models; Gasoline Engine Chain Saw which can be furnished in 24", 36" and 48" sizes—also pneumatic models, and MALL Electric Circular Saw, 2 models, 8" blade and 2½" cutting capacity, and 12" blade with 4½" capacity.

MALL TOOL COMPANY, 7730 South Chicago Ave., Chicago 19, Ill.

ARMY E NAVY

Mall PORTABLE POWER TOOLS

guide for the typist in positioning copy to be added to the printed schedules. As many copies as may be needed can be produced from the single typing.—*A. B. Dick Company, 720 West Jackson Blvd., Chicago 6, Ill.*

• • •

Respirator

Adjustable to the wearer's facial contours because of a patented air-tight rubber face cushion and "Face-Fit" body, the new AL-400 aluminum airline respirator is said to be both safe and comfortable. Dual air-supply tubes connect with the main air-supply tube, which has an individual filter. A reduction valve makes possible minute adjustments in air flow, and by expelling excess air creates a cool cushion of air under the helmet.

The respirator is supported by a web belt which allows unrestricted movement of the head and body.—*Pulmosan Safety Equipment Corp., 176 Johnson St., Brooklyn, N. Y.*

• • •

Sealing Compound

Designed for spray, brush or slush application, a new sealing compound known as Galco is a thiokol synthetic rubber compound of the latex type.

This compound has a very low diffusion rate, low solubility in aromatic fuel and water, and high adhesion; it is said to maintain a tight seal at extremely high or low temperatures.—*Presstite Engineering Co., 3900 Chouteau Ave., St. Louis, Mo.*

• • •

Bending and Straightening Machines

Modernized throughout, a new line o bending and straightening machines i six sizes, with capacities from 50 to 40

(*Continued on page* 109)

s, can handle 5 to 24-in. beams. The chines have welded steel frames and irely enclosed operating parts.

A continuously running ram with one ding block, striking against the pe to be bent midway between two ring blocks, represents the operating nciple of the machines.—*Thomas chine Manufacturing Co., Pittsburgh Pa.*

• • •

Self-Dumping Hopper

Handling of small parts is speeded in ny plants by the use of a new self-mping hopper, according to the man-cturer's announcement. This hopper, all-metal skid bin with a hinged bot-

m, can easily be picked up and moved hand-lift truck.

An electric fork truck must be used dumping, which is done by elevat- the hopper until the bin handle en-ges with a positive-action catch at the of the truck elevating column. The pty hopper is easily released by rais- the forks.—*Yale & Towne Manufac-ring Co., Philadelphia 24, Pa.*

• • •

Combustion Control

Fuel saving and increased heating ef-iency and convenience are provided a thermostatically regulated combus- control system, it is claimed. One its special features is a new baro-tric draft control, whose square vane, unted in a square channel, is said to ovide large air intake and positive cking action. Other features are a ermo-Draulic damper operator, a gic Dial thermostat and a limit con-l.

This new combustion control system been designed for use with all des of hand-fired fuel, adjusting the bustion rate to heating needs and nace capacity throughout the burn- process.—*Perfex Corp., 500 West lahoma Ave., Milwaukee 7, Wis.*

For tough lifting jobs in Industry—I'm the "Champ"
I'm the Lift in every sturdy BUDA JACK
1000 LBS.
500 LBS.
BUDA LIFT
USE ME!
ARMY E NAVY

Sizes and models for all lifting jobs Mechanical and Hydraulic Jacks

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THE BUDA COMPANY

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To Meet Every Need of the
PAVING CONTRACTOR

CEMENT BATCHERS

Manual automatic and semi-automatic weighing types. All-welded hoppers designed to assure free flow of materials and prevent arching of cement. Discharge valve provides positive, leak-proof operation. Overhead adapter scale frame protects operating part of the scale from dirt and accident . . . contributes to convenient operation.

ELEVATING CHARGER

Combines advantages of adaptability. portability and Can be towed behind a batch truck. Crew of two or three men can block it into position and have it weighing 34 E paver batches at the rate of 90 per hour in 1½ hours . . . without a crane. Quickly converted to a transfer plant or for charging truck mixers.

DUTCH MILL

Designed for economical handling of bulk cement on paving jobs. All cement handled mechanically by one man. Equipped to unload cement from either hopper or box cars. Erection and dismantling are quick and easy. 50, 100 and 150 barrels capacity.

PORTABLE SECTION BINS

For contractors who need greater storage capacity than is provided by Elevating Charger or Dutch Mill. Completely portable. Capacity may be increased in the field. Equipped for unloading and batching cement delivered in any type of transportation facilities. 240 bbl., 375 bbl. and 500 bbl. capacities. Elevator Equipment with capacities up to 300 bbls. per hour.

The C. S. Johnson
Company
Champaign, Illinois

Association Elections and Activities

Christopher D. McKeon, president of the Assciated Home Builders of San Francisco, was elected recently to the chairmanship of the Contractors' License Board of California, which supervises the activities of over 30,000 licensed contractors. J. Philip Murphy and Michael Costello of San Francisco and Roy M. Butcher of San Jose, are other members of the board.

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At a recent meeting of the Philadelphia section, American Society of Civil Engineers, Francis S. Friel was elected president. He directs the engineering staff of Albright & Friel Inc., consulting engineers, specializing in water supply and purification, sewerage and sewage treatment, industrial waste disposal, incineration and general municipal engineering.

M. Allyn Wadhams, president and treasurer of the Wadhams, May & Carey Co., Hartford, Conn., general contractors, has been elected chairman of the Hartford Housing Authority to succeed Berkeley Cos.

At Ogallala, Neb., the following were named temporary directors of the new Greater Platte Valley Irrigation Development Association; R. D. Hughes, Ogallala; E. A. Geisert, Rascob; Bruce Snyder, Paxton, and B. Russell Anderson, Ogallala.

A. I. Hoem, was elected president of the Montana Society of Engineers at the annual meeting held recently in Butte. F. A. Linforth is the retiring president. Other officers are: Prof. E. W. Schilling of the Montana State College faculty at Bozeman, vice president; C. H. Steele, Butte, second vice president; F. D. Schwanz, reelected secretary and treasurer, and M. W. Plummer, Butte, and D. K. Drake, Helena, trustees.

The Wisconsin Society of Professional Engineers has granted a charter to a Fox River Valley chapter. Temporary officers are F. J. Steeno, Green Bay, chairman; and J. B. Johnson, Sturgeon Bay, secretary.

New officers of the Cleveland, Ohio, Engineering Society are: Don E. Inman, president; Thomas M. Skove, vice-president; E. R. McCarthy, treasurer; G. C. A. Hantelman, secretary-manager; and George F. Burrows, librarian.

The Ohio Society of Professional Engineers elected T. W. Rolph of Newark to its presidency at its recent 65th annual convention. John F. Hale of Dayton, and Fred Hubbard of Youngstown, were named vice presidents.

J. R. Keane has been re-elected president of the Western Asphalt Association. Other officers named are J. R. Pemberton and R. M. Blodgett, vice-presidents; C. W. Powell, treasurer, and Frank L. Mark, managing engineer.

J. T. Turnbull of Saint John has been elected president of The Association of Professional Engineers of the Province of New Brunswick.

Officers of the Kansas Society of Professional Engineers are: D. F. Joslin, Topeka, president; George Nettles, Pittsburg, vice-president; H. H. Munger, Manhattan, secretary; and K. E. Rector, Topeka, treasurer. Other directors are: A. M. Meyers, Kansas City, Maloy Guinn, Clay Center, and C. H. Scholer, Manhattan.

Officers of the Association of Professional Engineers of Nova Scotia are: J. H. N. Jones, Liverpool, president; J. F. Kaye, Halifax, vice-president; and S. W. Gray, Halifax, secretary-treasurer. Named to the council are J. F. F. MacKenzie, of Amherst, J. L. Cavanagh, of Malagash, and E. L. Baillie and W. H. Noonan, of Halifax.

Captain Tom Fenlon of Hunt, Tex., has been re-elected chairman of the Upper Guadalupe River Authority; W. A. Fawcett, vice chairman, and Walter E. Saenger, secretary and treasurer.

NEW TRADE PUBLICATIONS

Arc Welding Electrodes—A new line f smooth-flowing arc welding electrodes with quiet arc characteristics has been nnounced by the Allis-Chalmers Mfg. Co. The new electrodes, both a.c. and .c. types, use the standard American Welding Society number and color, simlifying selection and handling. A new ulletin describing the electrodes is vailable upon request. It includes a rice sheet, zone classifications, freight olicy, quantity, discounts, and term exlanations.—*Allis-Chalmers, Milwaukee , Wis.*

V-Belt Drives—A 44-page handbook n industrial fractional horsepower V-elt drives has been published. It notes e trend toward larger sheaves in both actional horsepower and multiple V-elt drives, describes the construction nd gives prices and data on both eaves and belts.

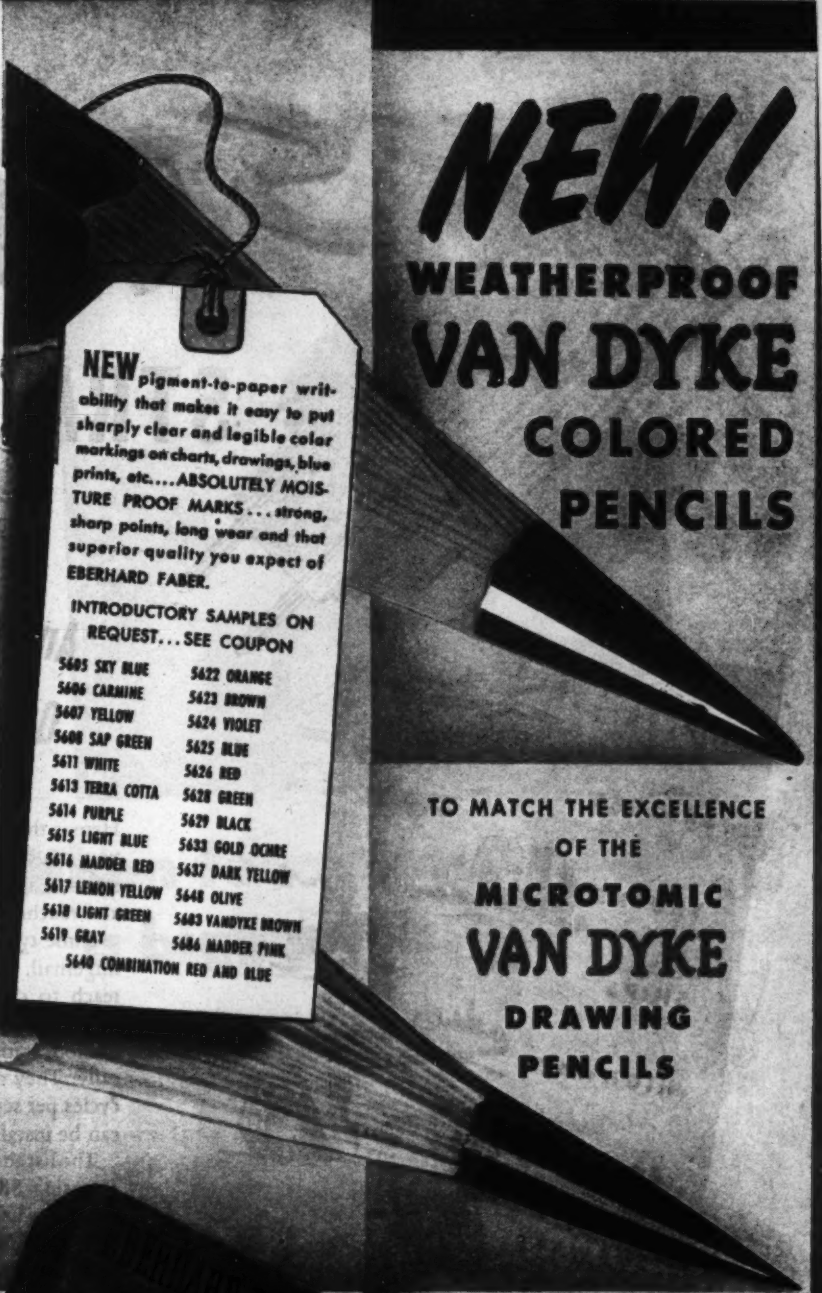
There is a chapter on proper selection f FHP belt drives, with formulas, to-ether with a page on how to get the ost service.—*The B. F. Goodrich Co., kron, Ohio.*

V-Belts, Sheaves and Drives—Each f the various V-belts, sheaves and rives in what are described as the most ccurately calibrated line of V-belt drive uipment developed is described in a lletin. Five special kinds of V-belts, ch designed for a specific type of proction, are reviewed. The four-speed anging methods used in these sheaves o are described.—*Allis-Chalmers, ilwaukee 1, Wis.*

Tubes and Casing Repairs—An inmative book features products availe from a leading producer of tubes d casing repairs for both natural and thetic rubber, and concentrated heat-units for camp stove cooking.—*J. W. eaker Corp., 3059 N. Weil St., Milukee 12, Wis.*

Hoisting Engines—A bulletin on m hoisting engines and boilers gives e complete data than previous ones. *merican Hoist & Derrick Co., St. l 1, Minn.*

oad Building Equipment—Looking ad to after the war when municipal s of road building and maintenance ipment again will be reconditioning



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5623 BROWN
5624 VIOLET
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JOHNSON'S
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To Meet Every Need of the
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CONTRACTOR

CEMENT BATCHERS

Manual automatic and semi-automatic weighing types. All-welded hoppers designed to assure free flow of materials and prevent arching of cement. Discharge valve provides positive, leak-proof operation. Overhead adapter scale frame protects operating part of the scale from dirt and accident . . . contributes to convenient operation.

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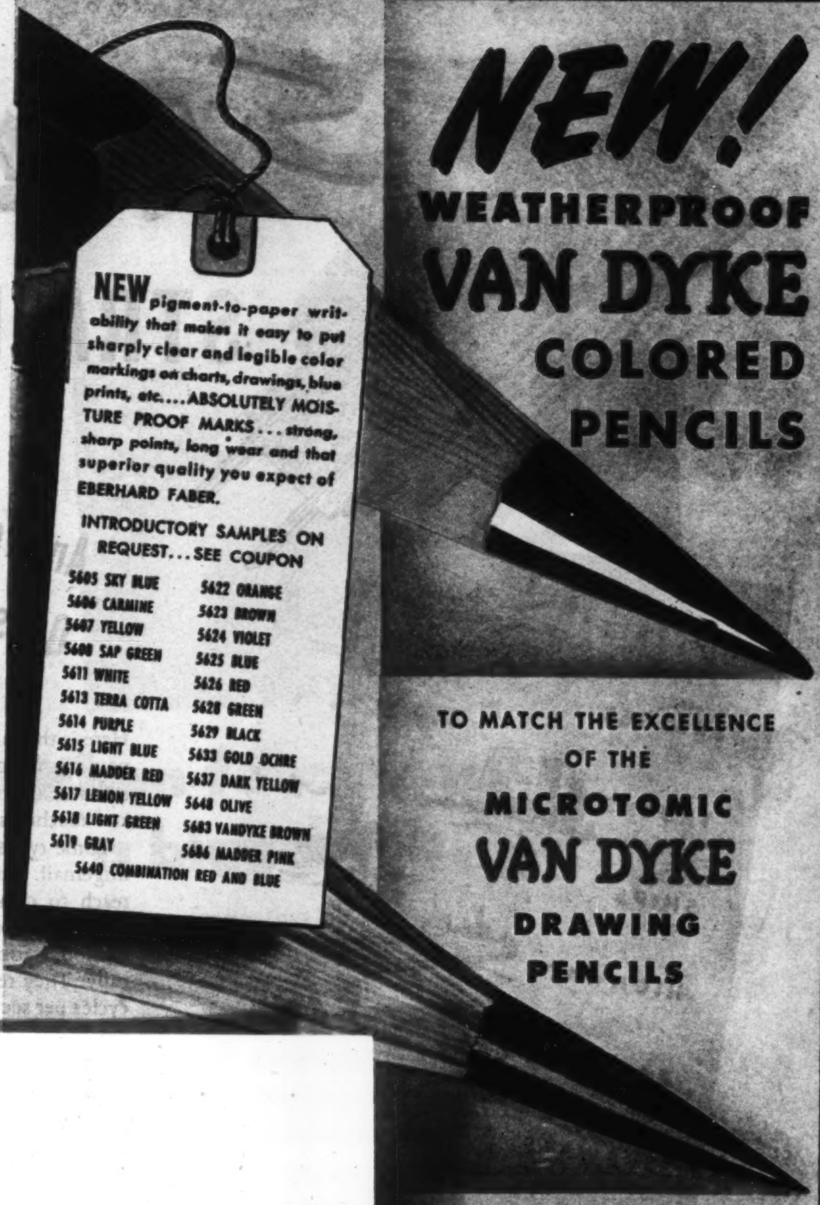
V-Belts, Sheaves and Drives—Each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Answer "Will it take it?" Questions for You . . .

Here is the most simple, accurate and convenient device you can imagine for checking static or dynamic *design* stresses against *service* stresses in complex structures and machines.

Some types of SR-4 gages are as small as your little fingernail. They can be installed any place you can reach to cement them down on plane or moderately curved surfaces. They measure strains to one part in two million, statically, and to nearly as small a value dynamically. They respond without loss of linearity from zero cycles per sec to more than 30,000. Cost is low, so units can be installed in quantity in large structures.

The list shows some of the many fields where engineers are using SR-4 Strain Gages. Your own ingenuity will suggest where they can serve you. The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia, Penna., U. S. A.

SEND FOR BULLETINS

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SR-4—Scanning Recording Equipment . . . Bulletin 172
SR-4—Torquemeter . . . Bulletin 165
SR-4—Applications . . . Bulletin 171
SR-4—Applications to Shipyard Problems . . . Bulletin 17
SR-4—Bonded Resistance Wire Strain Gage . . . Bulletin 17

BALDWI
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STING EQUIPMEN

l and constructing new highways, a oklet tells of the tasks which will face y, county and state road officials and uipment operators. The booklet, 16 ges in two colors, is titled "A Look p the Road."—*Caterpillar Tractor Co., eoria, Ill.*

Postwar Prospects—A brochure, Postwar Prospects" has been designed give United States manufacturers of etal products a more intimate knowlge of the opportunities for them in nada.—*Promotional Engineer, Hamil- Bridge Co., Ltd., Hamilton, Ont.*

Dust Collector—A portable dust colctor is described in a 4-page folder. he apparatus is used for rock drilling general excavation, mines, tunnels, arries, foundries, stone cutting sheds, ower plants and industrial plants.—*alph B. Carter Co., 192 Atlantic St., ackensack, N. J.*

Cooling Towers—An illustrated catag describes horizontal induced draft oling towers. While originally develped for unusually large-capacity serves, small models are now serving diesel ngines, gas compressors, refrigeration achinery and many other such applicaons involving lesser GPM's. The small odels have been worked out to make e operating advantages and economies f the horizontal induced draft design vailable to the full range of capacities. —*The Marley Co., Inc., Kansas City, an.*

Portland Cement—A two-purpose ooklet honors employees by telling the tory of their 1943 safety record in the uarries, mill and plants, and by showg pictorially just where and by whom his record was achieved.

At the same time it serves to give a ore intimate and comprehensive idea f the men and machines involved in the anufacture of the product.—*Huron ortland Cement Co., Detroit, Mich.*

Steam Gasoline and Electric Hoists —This bulletin gives details of generalurpose and contractors' types of hoists, ncluding derrick hoists for hook and rab bucket work with and without winging gear and separate swinging oists and barge derrick hoists.—*Lidgerwood Mfg. Co., Elizabeth 3, N. J.*

Boiler Meter—This publication describes methods of checking combustion fficiency in boiler plants. Included also re the requirements for an ideal boiler eter, and the detailed description of ne which it is claimed completely meet hese ideal requirements. Installation etails are also given.—*Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia 32, Pa.*

When fewer men must do a bigger job...

Any measure that saves man-hours becomes increasingly important when costs are the governing factor.

Every time a worker leaves his job for a drink of water, precious moments are wasted; every time he is a sick-absentee whole days are lost.

A Quicker, Safer Method...

The use of Dixie Portable Water Carriers has solved the problem on many a wartime construction project. Men are served in minimum time right where they work...and each drinks from a clean, individual Dixie or Vortex Cup.

They help to check contagion at the contamination point...avoid the possible spread of disease from mouth-to-mouth contact. And workers are far better satisfied with this modern watering method.

Dixie and Vortex Cups are made at Easton, Pa. Chicago, Ill., Darlington, S. C. and Toronto, Canada.

Write for descriptive folder giving complete information on this portable water service, including tanks, dispensers and cups.

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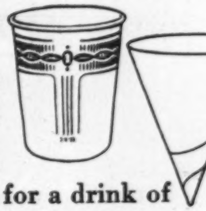
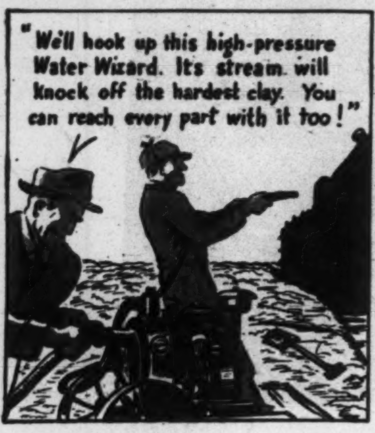


"HERE'S MY SECRET FOR CLEANING EQUIPMENT"
- SAID THE VETERAN CONTRACTOR...
"Having trouble cleaning out that mud between the tracks and main frame? Here, I'll show you a real improvement over crowbars and shovels"


"We'll hook up this high-pressure Water Wizard. It's stream will knock off the hardest clay. You can reach every part with it too!"

"It has lots of other uses besides. You're time and money ahead with a High-Pressure WATER WIZARD".

YOU NEVER owned handier pumps than Marlow High-Pressure "Water Wizards." You can use these *powerful self-priming centrifugals* for jetting, feeding mixers, testing water lines, fire protection and many other jobs.

Made in 2 and 3-inch sizes to deliver 6,000 to 16,000 gallons per hour at pressures from 50 to 100 pounds. Available on skids or wheels. Light, compact, easy to handle . . . and they'll take plenty of abuse without causing trouble.

Ask your nearest Marlow distributor for a demonstration, or write for the free 80-page Marlow Pumpbook.

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RIDGEWOOD, NEW JERSEY

With a HYSTER. . . .
the situation is WELL IN HAND

There's nothing too tough—the load or the under-foot—when a HYSTER Towing Winch teams up with your "Caterpillar" Diesel Tractor. These HYSTER huskies always keep the situation well in hand.

That's because every HYSTER Towing Winch has the built-in strength and stamina for years of severe service; because perfect control is maintained from the driver's seat—for any operation from positive braking to any lift or pull . . . For tractor drum service, see your "Caterpillar" dealer about the HYSTER line of Winches and Donkeys.

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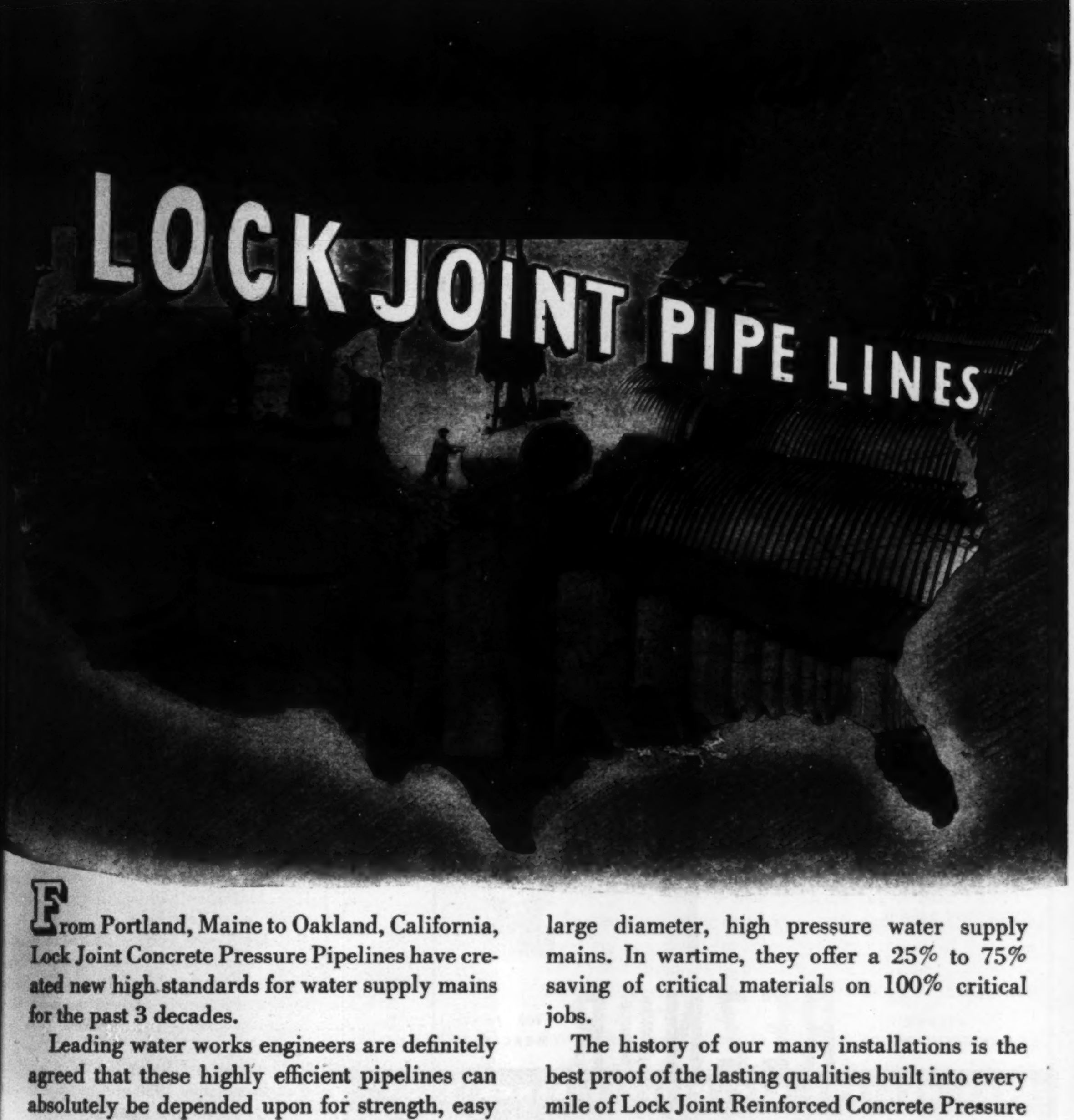

From Portland, Maine to Oakland, California, Lock Joint Concrete Pressure Pipelines have created new high standards for water supply mains for the past 3 decades.

Leading water works engineers are definitely agreed that these highly efficient pipelines can absolutely be depended upon for strength, easy installation, adaptability, safety, high carrying capacity, water-tightness, long life and economical service.

In peacetime Lock Joint Pipelines are built with an eye to long-range programs and are recognized as the best method of constructing large diameter, high pressure water supply mains. In wartime, they offer a 25% to 75% saving of critical materials on 100% critical jobs.

The history of our many installations is the best proof of the lasting qualities built into every mile of Lock Joint Reinforced Concrete Pressure Pipe.

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Whether your project is large or small, for the present or the future, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

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White Plains, N.Y. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

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ON NEXT SEASON'S
HEATING
BILL

It won't be long before the heating bugaboo rears its costly head again. Here's an easy method to save on fuel costs.

PAY ONLY FOR HEAT YOU USE

Only during two or three months of the heating season does the weather necessitate full-scale firing. When you pay only for the small amount of heat you actually consume, money is saved.

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You can turn on or turn off a Reznor instantly. Thermostat control is available. During mild weather, heat is needed only few hours a day . . . No need to pay for heat when you don't need it.

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No matter what size area, we have a Reznor Unit Heater for the job. Suspended and floor models. Used as auxiliary and primary heat in plants, offices, stores, schools, churches, bowling alleys, commercial buildings. Send for catalog.

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105 JAMES STREET
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"GAS HEATERS EXCLUSIVELY SINCE 1888"

MANUFACTURERS' ACTIVITIES

A NEW $200,000 corporation, the Construction Equipment Co., has started business in Birmingham, Ala., as distributor for Alabama and Florida counties of machinery, builders' equipment and supplies. Headed by F. H. Ragsdale as president, it will have a branch office at Montgomery in charge of E. F. Biggs, vice president.

ERNEST MAHLER, executive vice president of the Kimberly-Clark Corp., Neenah, Wis., has been elected to the board of directors of the Allis-Chalmers Co., Milwaukee, to take the place of R. G. Hutchins, New York, who has retired after 31 years of service. Mahler is an engineer and holder of many basic patents in the pulp and paper field.

ARRANGEMENTS have been concluded by Schramm, Inc., manufacturers of air compressors, West Chester, Pa., for representation in the southern Idaho territory by the Western Equipment Co., 4009 Fairview Avenue, Boise, Ida.

E. R. GALVIN, general sales manager of the R. G. Le Tourneau, Inc., manufacturers of heavy grading machinery, has been elected to succeed John K. Colgate, as president of the Tyson Bearing Co., Massillon, Ohio. Colgate has become board chairman.

Colgate, who succeeded Ralph Maxon as president last February, said he was giving up active leadership of Tyson to resume his active association with Van Strum & Towne, Inc., of New York, investment counsellors.

The new president has been with Le Tourneau since 1938 and previously had been general sales manager for the Cat-

LEWIS & McDOWELL Inc.
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GUNITE work in all its Branches
Prestressed Gunite Tanks
Waterproofing, all types
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Synthetic Rubber and other special Tank Linings
Dam Repairs and Reconstruction

285 Madison Avenue, New York, N. Y.
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OHIO
LOCOMOTIVE CRANES

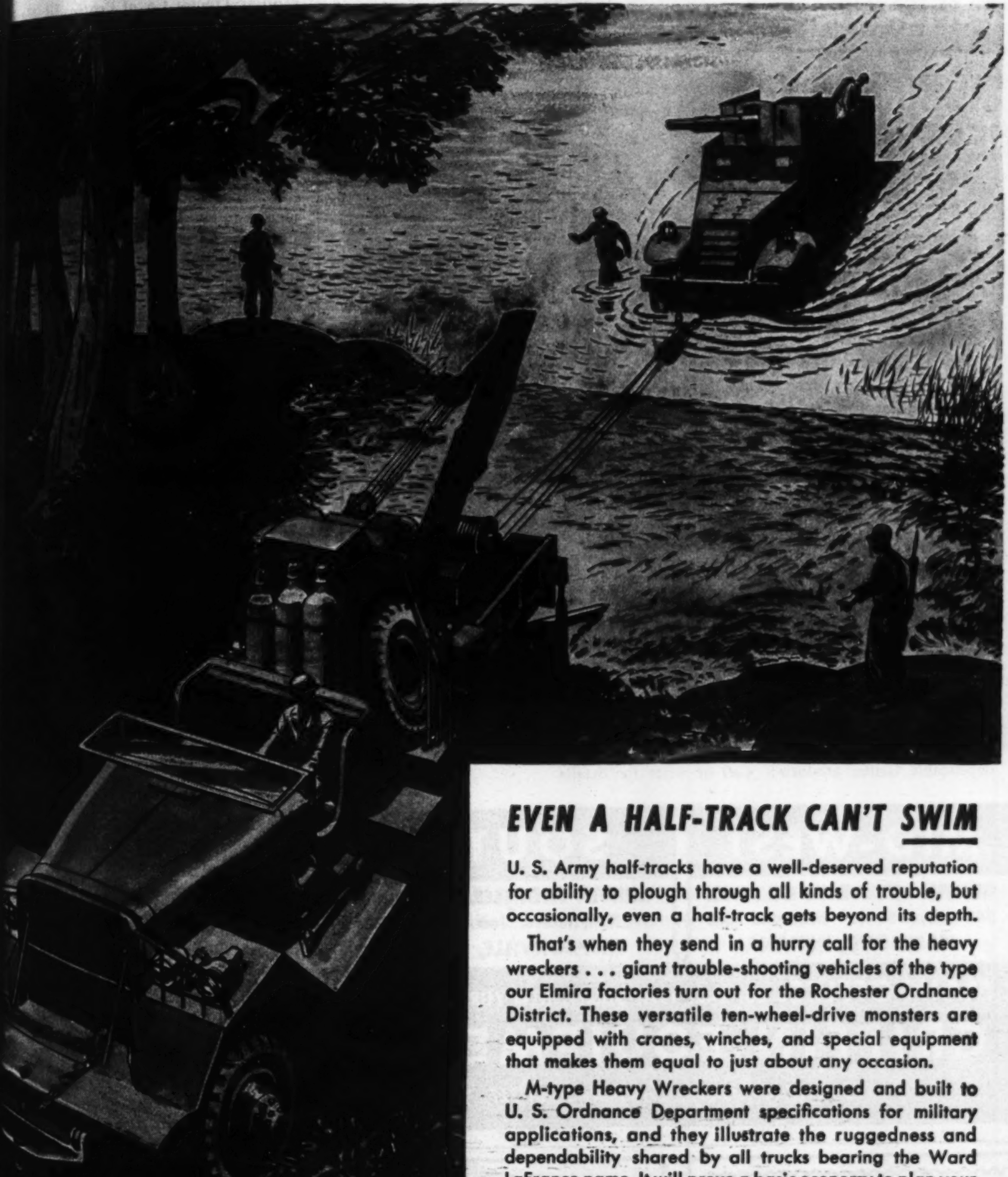
20 to 50 TON CAPACITY

DIESEL • ELECTRIC • GASOLINE • STEAM
The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS OHIO

DRILLING
ANYWHERE

We look into the earth

PENNSYLVANIA
DRILLING COMPANY
PITTSBURGH, PA.



EVEN A HALF-TRACK CAN'T SWIM

U. S. Army half-tracks have a well-deserved reputation for ability to plough through all kinds of trouble, but occasionally, even a half-track gets beyond its depth.

That's when they send in a hurry call for the heavy wreckers . . . giant trouble-shooting vehicles of the type our Elmira factories turn out for the Rochester Ordnance District. These versatile ten-wheel-drive monsters are equipped with cranes, winches, and special equipment that makes them equal to just about any occasion.

M-type Heavy Wreckers were designed and built to U. S. Ordnance Department specifications for military applications, and they illustrate the ruggedness and dependability shared by all trucks bearing the Ward LaFrance name. It will prove a basic economy to plan your postwar fleet of Ward LaFrance trucks, *engineered to the job*, now. Why not write our Sales Department today?

GAI **WARD LAFRANCE**

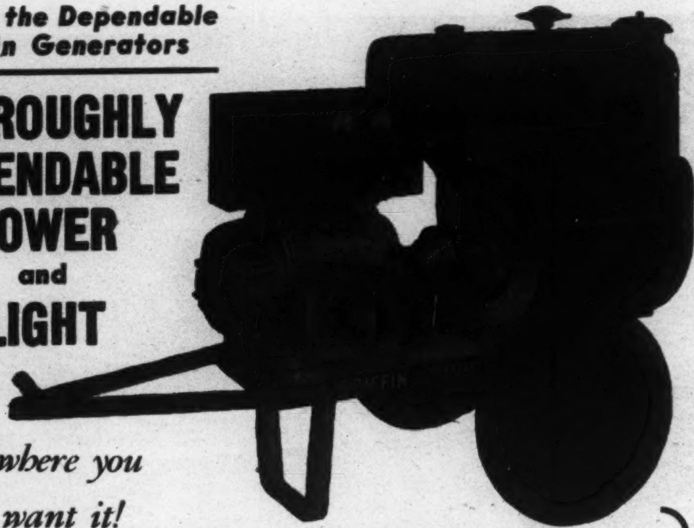
TRUCK DIVISION • GREAT AMERICAN INDUSTRIES, INC.
ELMIRA • NEW YORK

OTHER DIVISIONS: CONNECTICUT TELEPHONE & ELECTRIC DIVISION, MERIDEN, CONN. • VIRGINIA RUBATEX DIVISION, BEDFORD, VA. • RUTLAND ELECTRIC PRODUCTS DIVISION, RUTLAND, VT.

One of the Dependable Griffin Generators

THOROUGHLY DEPENDABLE POWER and LIGHT

anywhere you want it!



MODEL 5-DR

Steel tired wheels during the rubber shortage

Engineered and built to give you the same dependable Long Life as all Griffin products. Stands up under toughest usage on construction jobs. Simple design.

Gasoline engine is a standard well-known make; easily serviced; rugged; simple. Coupling is all-steel, running in a bath of oil. Generator is two-bearing, designed to take periodic overloads without damage. Two men can handle *anywhere* . . . one man, on a normally level surface. No gadgets to fool with. Just start the engine and plug in! Capacity 5 to 7½ K.W. If your job requires the operation of electric tools and motors or lighting, as, when, and where needed—here is your most economical equipment. It's one of the dependable Griffin products! Call or write for details.

MID-WEST

GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

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GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE, 4, FLA.

MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.

GRIFFIN EQUIPMENT
and Supply Corporation

erpillar Tractor Co. of Peoria, Ill. He is president of the Highway Industries Association, Inc., and vice-president of the American Road Builders Association.

APPOINTMENT of George J. Dimond as sales manager of the Insley Manufacturing Corp. of Indianapolis, Ind., has been announced by William B. Elliott, president. Mr. Dimond succeeds Ray W. Dorward, who has retired.

The new sales manager has long been a prominent figure in the construction equipment industry. Twenty-five years ago he joined The Koehring Co. of Milwaukee, as field service representative, rising to the post of sales manager, which position he held when he resigned to join Insley. Prior to his affiliation with the former company, he was engaged in the construction industry.

PROMOTION of F. M. Beaudoin from employment manager of U. S. Steel Supply Co., Chicago, to the new position of manager of industrial relations for the Petroleum Iron Works division of the U. S. Steel Products Co., which maintains its headquarters in Sharon, Pa., has been announced. Both companies are U. S. Steel Corporation subsidiaries.

Mr. Beaudoin began with U. S. Steel in 1939 when he entered the employ of Carnegie-Illinois Steel Corp. at Gary Works, Gary, Ind. Later, he was transferred to the South Chicago plant of Carnegie-Illinois, and in 1942 became employment manager of the U. S. Steel Supply Co. In his new position he will

EPPINGER AND RUSSELL CO.
Wood Preservers Since 1878
All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or
DU PONT C Z C Chromated Zinc Chloride
80 EIGHTH AVE., NEW YORK, N. Y.
POLES, CROSS ARMS, PILING, TIES POSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla Norfolk, Va. Long Island City, N. Y.

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TRENTON N.J.
Manufacturers of STEAM TURBINES
HELICAL AND WORM GEARS
PUMPS
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PUMP PRIMING SYSTEMS
CENTRIFUGAL BLOWERS AND COMPRESSORS
DE LAVAL IMO OIL PUMPS
De Laval STEAM TURBINE CO

BAILEY METERS AND CONTROLLERS
FOR SEWAGE TREATMENT AND WATER SUPPLY . . .
● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.
BAILEY METER COMPANY
[illegible] IVANHOE ROAD ● CLEVELAND, O.
Baily Meter Co. Ltd., Montreal, Canada

Where loads are measured in tons . . .

it's a job for **PURPLE STRAND**

The traveling crane sweeps forward majestically, swinging a heavy casting. At the designated point, it slowly lowers its burden, setting it down gently, with all the finesse of a giant human hand.

Nearby, in a steel plant, another great crane guides a ladle of molten metal. The stopper is opened, a flow of white-hot steel goes hissing into the ingot mold; the ladle then travels down the line, filling other waiting molds.

A huge responsibility rests upon the wire rope that handles these loads. But, to Bethlehem Purple Strand, jobs like this are all in the day's work, for Purple Strand is made of the strongest, toughest steel that ever goes into wire rope. Purple Strand is the kind of rope that you naturally specify for the gentle handling of huge, ponderous, unwieldy loads—for jobs where dependability is so vital that only the *best* wire rope will do.

If in doubt of the most suitable rope for a given job, you can be sure of expert engineering advice by calling in a Bethlehem wire rope man. He's a specialist in his line, and what's more there isn't a better rope made than the kind he represents.

BETHLEHEM STEEL

When you think WIRE ROPE
. . . think BETHLEHEM

SAVE MANPOWER, MAINTENANCE, SPACE, AND ORIGINAL COST!

Model 105 Auto-Air on standard 1½-ton truck illustrated

DAVEY Heavy-Duty Truck Power Take-Off in the truck-drive shaft eliminates separate compressor engine, drives Davey Air-Cooled Compressor from the truck engine providing extra truck space for men, material and equipment. Davey Air-Cooled Compressors and H. D. Truck Power Take-Offs are engineered for the highest operating efficiency. Davey originated truck-driven Auto-Air Compressors and has more of these units in service than all other manufacturers combined. Davey alone offers Auto-Air Combinations . . . Compressor and Power Take-Offs . . . Guaranteed as a unit.

Davey Auto-Air is available in 60, 105, 160, 210 and 315 cubic feet capacities. In addition to standard Auto-Air Compressors, Davey offers Compressor-Welder Combinations for mounting on the same truck, driven by the truck engine through the Davey Heavy-Duty Power Take-Off.

Write For Complete Davey Catalog E-172.

Davey Compressor Co., builds a complete line of Portable and Stationary Compressors, Heavy-Duty Truck Power Take-Offs and Pneumatic Saws.

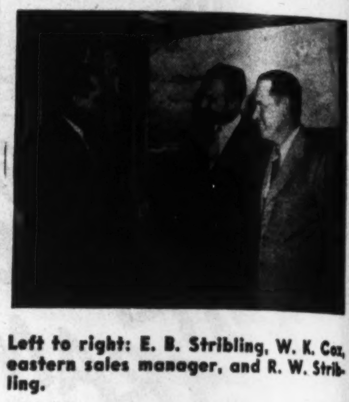
DAVEY
Compressor Co.
KENT, OHIO
DEALERS IN
PRINCIPAL CITIES

ARMY E NAVY

be responsible for all industrial relations activities of the U. S. Steel Products Co.'s plants in the middle and southwestern regions.

A NEW distributor for products of Caterpillar Tractor Co., Peoria, Ill., took over the Mississippi territory Aug. 1. Known as the Stribling Machinery Co., it will replace the Mississippi Tractor & Equipment Co., from whom they have purchased land, buildings and fixtures at Jackson, Miss.

R. W. and E. B. Stribling, native Mississippians, have been in the heavy machinery business for a number of years. R. W. Stribling started with the Beavers Motor Co. at Canton, Miss., in 1927 and has operated his own company, the Stribling Motor Co., at Hattiesburg, Miss., since 1930.

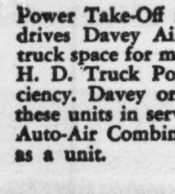


Left to right: E. B. Stribling, W. K. Cox, eastern sales manager, and R. W. Stribling.

E. B. Stribling also started with Beaver Motors Co. in 1928, becoming associated with the Caterpillar distributor for Louisiana in 1934 and remaining with that concern for eight years. In 1942, he and his brother organized the Stribling Equipment Co. which he operated.

SIDNEY HOGG has been appointed chief engineer and acting sales manager of Hamilton Bridge Western Ltd., with headquarters in Vancouver, B. C. The company is the western subsidiary of the Hamilton Bridge Co. of Hamilton,

RODNEY HUNT



SLUICE GATES

Also flap and mud valves, shear and filler gates. Dependable equipment since 1840.

Write for Special Catalog Today

RODNEY HUNT MACHINE CO.
79 Lake St., Orange, Mass., U.S.A.

MITCO
OPEN STEEL FLOORING

Pressure Formed
90% Open Area
Easy to Install

Hendrick Manufacturing Company
45 Dundaff Street, Carbondale, Pa.

Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 40-50 Church St., N. Y.

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Machinery
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W. K. Cox,
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RECORD

Nature made Asbestos
HERE IS HOW KEASBEY & MATTISON IS MAKING IT SERVE THE WATER WORKS FIELD
For Dependable Service Over the Years . . . Specify K & M "Century" Pipe

● K&M "Century" Pipe assures you of permanent, trouble-free mains because it is made of asbestos fibre and portland cement . . . two of the most durable elements known to man. Being non-metallic, "Century" Pipe is unaffected by electrolysis, and is immune to the effects of corrosion. There can be no loss in pressure *or* flow, due to tuberculation, when you use "Century" Asbestos-Cement Pipe.

"Century" means real money savings to the community, too, because it costs less to install. Light and easy to handle, "Century" Pipe requires fewer men for installation, even where the larger sizes are involved. An especially important consideration today.

Insure constant good will and satisfaction in your community . . . install K&M "Century" Asbestos-Cement Pipe.

"Century" Pipe is available *NOW* for approved municipal work. Why not inquire about it further at your first opportunity?

ARMY E NAVY
K&M best in asbestos

Our Ambler plants proudly fly the Army-Navy "E" flag with its star—on honor warded K&M employees "for continued utstanding production of war materials."

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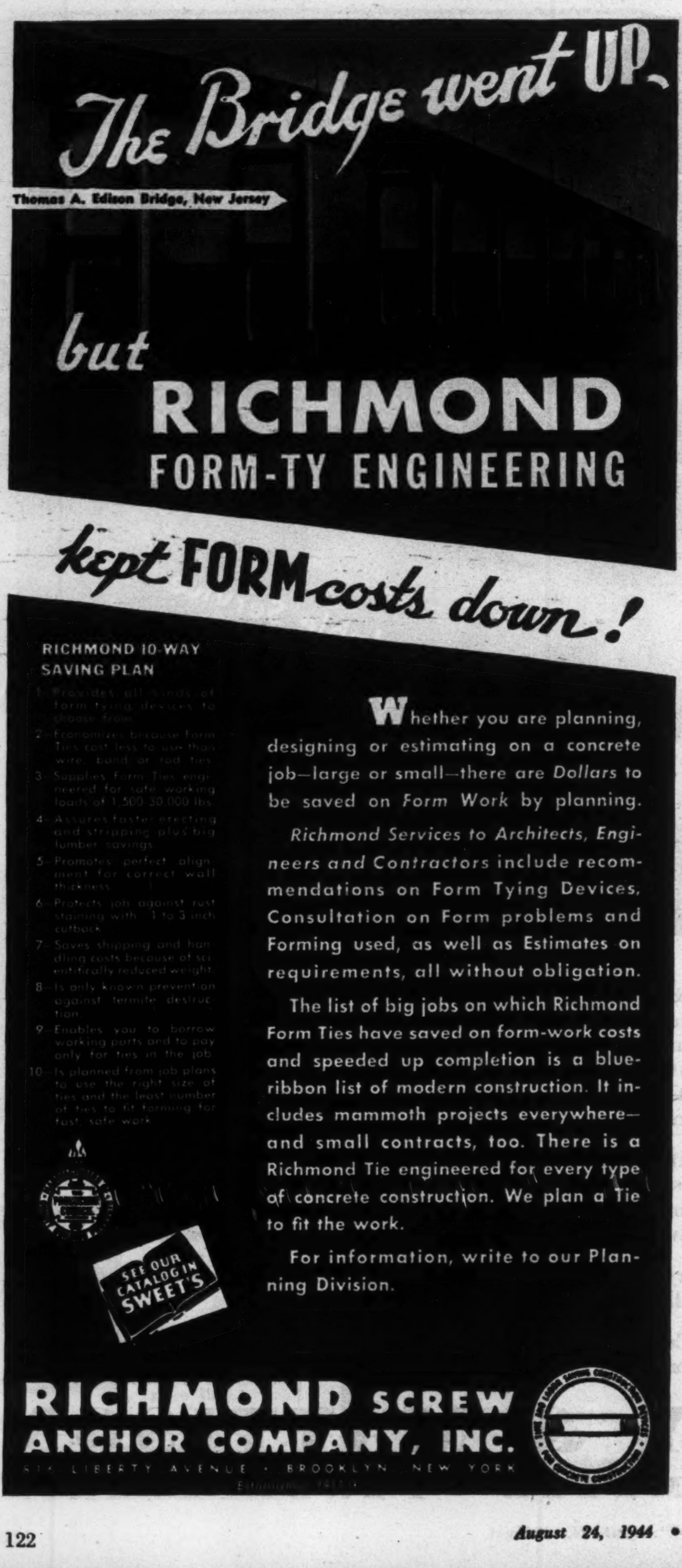

The Bridge went UP

Thomas A. Edison Bridge, New Jersey

but
RICHMOND
FORM-TY ENGINEERING

kept FORM costs down!

RICHMOND 10-WAY
SAVING PLAN

1—Provides all kinds of form tying devices to choose from.
2—Economizes because Form Ties cost less to use than wire, band or rod ties.
3—Supplies Form Ties engineered for safe working loads of 1,500-30,000 lbs.
4—Assures faster erecting and stripping plus big lumber savings.
5—Promotes perfect alignment for correct wall thickness.
6—Protects job against rust staining with 1 to 3 inch cutback.
7—Saves shipping and handling costs because of scientifically reduced weight.
8—Is only known prevention against termite destruction.
9—Enables you to borrow working parts and to pay only for ties in the job.
10—Is planned from job plans to use the right size of ties and the least number of ties to fit forming for fast, safe work.

Whether you are planning, designing or estimating on a concrete job—large or small—there are *Dollars* to be saved on *Form Work* by planning.

Richmond Services to Architects, Engineers and Contractors include recommendations on Form Tying Devices, Consultation on Form problems and Forming used, as well as Estimates on requirements, all without obligation.

The list of big jobs on which Richmond Form Ties have saved on form-work costs and speeded up completion is a blue-ribbon list of modern construction. It includes mammoth projects everywhere—and small contracts, too. There is a Richmond Tie engineered for every type of concrete construction. We plan a Tie to fit the work.

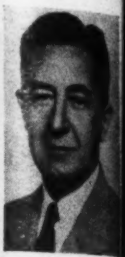
For information, write to our Planning Division.

SEE OUR CATALOG IN SWEET'S

RICHMOND SCREW
ANCHOR COMPANY, INC.
816 LIBERTY AVENUE • BROOKLYN, NEW YORK
Established 1911

Ont. Mr. Hogg has been connected f many years with the St. John Drydock and Shipbuilding Co., of St. John, N. B. recently as superintendent of new shi construction.

Perry D. Helser, formerly chief the magnesium branch of the War Pro duction Board in Washington, has been named secretary-director of the newly-formed Magnesium Association, with headquarters at 30 Rockefeller Plaza, New York. The membership of this association consists of producers, fabricators, smelter and consumers of magnesium, number ing 33, a substantial portion of the i dustry. Its purpose is to develop the u of magnesium and its products, and correlate technological progress in th industry. The production of magnesiu before the war was 6 million lb. p year, whereas the present capacity is 6 million lb. E. S. Christiansen, vice pres dent, Apex Smelting Co., Chicago, president; C. C. Loomis, president, Ne England Lime Co., Canaan, Conn., vice president; and C. E. Larson, ma ager of operations, White Metal Rolli and Stamping Corp., Brooklyn, N. Y is treasurer.



Announcement is made by Woo Manufacturing Co., Los Angeles, Cali manufacturers of the Wood Roadmixe traveling mixing plant, of the appoin ment of Coast Equipment Co., S Francisco, as distributors. This compa serves northern California and weste Nevada.

The South Carolina Equipment C of Columbia, S. C., construction equi ment distributor, has been appoint exclusive distributors of Diamond crus ers, screens, conveyors, portable pla and other equipment for the Diamo Iron Works, Inc., Minneapolis, Minn.

The Houston Pipe and Steel Co. Houston, Tex., has inaugurated a m bile, 32-foot-long field service unit, first of its kind to be used in the sou west district, according to G. W. Moss, construction manager for firm.

The unit contains an engineering se ice and office and a completely equipp tool room. It can be moved to any fi plant, or refinery for immediate wo With the unit go skilled mechanics work on pipelines, plant maintena and repair, and unit shutdowns. company specializes in prefabric steel and pipe.

Giants at work

On U. S. Royal Earth Mover Tires!

Building airports where pastures were before is a giant's work, work for giants like this Le Tourneau carryall and these U.S. Royal Earth Mover tires. But even a giant has to watch out for the giant killers.

Tires are hard to get today...so it's just plain common sense to watch out for things that kill tires, to give them the kind of care that keeps them on the job shouldering their full share of the load to the last mile.

Whether you are operating on the road or off the road, whether you have 3 vehicles or 300 or more, "U.S." has a service plan that can cut your tire costs, reduce lost time due to tire failures, and give you an accurate picture of how your tires are doing on every vehicle.

Call your local independent "U.S." Truck Tire Distributor today. Ask him to explain "U.S." Transportation Maintenance and show you how it can help you get more *work* from your tires.

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UNITED STATES RUBBER COMPANY

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New Ideas for STRUCTURAL PLANNING

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"The best guide in the industry for open steel flooring construction." That's what hundreds of plant managers and superintendents call the new **BATES • GRATES** illustrated catalog. It's particularly valuable now for making necessary structural changes. And, it gives you vital information on how to improve plant design.

WHAT THIS BOOK TELLS YOU

How to increase the strength and load-carrying ability of your steel treads and flooring.

How to make your steel flooring safer—free from grease, water and other slip-encouragers.

How to ease your floor and stair tread maintenance problems by eliminating hazardous, grease-catching structures.

How to determine the exact safe loads for open steel flooring—by using the handy **BATES** chart.

. . . and many other important facts for construction planning now and after the war. Be sure to send for your copy of the new **BATES • GRATES** catalog today.

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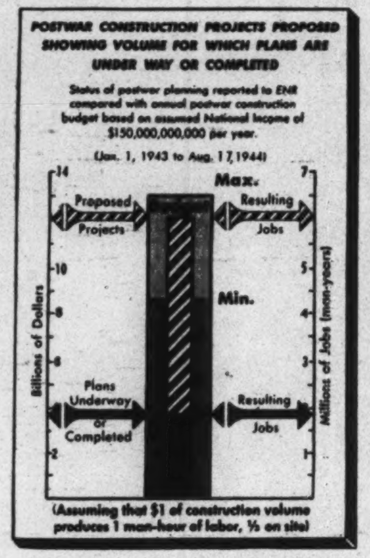
WALTER BATES COMPANY, INC.
JOLIET • ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

POSTWAR PROJECTS



POSTWAR CONSTRUCTION PROJECTS PROPOSED SHOWING VOLUME FOR WHICH PLANS ARE UNDER WAY OR COMPLETED

Status of postwar planning reported to *ENR* compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year.

(Jan. 1, 1943 to Aug. 17, 1944)

(Assuming that $1 of construction volume produces 1 man-hour of labor, ⅓ on site)

Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to ENGINEERING NEWS RECORD.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume ad in jobs or man-years of labor, how fast this reservoir of future work is filling up.

WATER SUPPLY

Conn., New Britain—City Water Dpt., Wm. E. Lyler, chn. Bd. Water Comrs., City Hall, preliminary surveys water sys. expan., incl. collecting distributing and storage facilities. Over **$300,000.** G. Molleur, City Hall, engr.

Mass., Harvard — Town Bd. Selectmen, Town Hall, 100,000 ft. 6- to 12-in. watermains, steel standpipe and pump. station. **$450,000.** H. E. Bailey, 177 State St., Boston, consult. engr.

Mo., Farmington — City, plans 80% completed, watermain exten. **$20,000.** B. F. Walther, city engr.

Mo., Paris—City, c/o V. Opie, supt. Water Dpt., City Hall, installing water softening plant. Over **$15,000.**

★**Mo., St. Louis**—City, M. M. Kinsey, pres., Bd. P. Service, 304 City Hall, 12 and Market Sts., Zone 3, voted **$7,500,000** bonds exten., imprvs. water works sys. $11,500,000 also available. CD 6/23—ENR 7/13.

N. Y., Orangeburg—Dpt. P. Wks., State Office Bldg., Albany, plans completed MH-5 water supply sys., at Rockland State Hospital for Dpt. Mental Hygiene, State Office Bldg., Albany, **$500,000.** Div. Construction, Div. Architecture, C. J. White, comr. Architecture, State Office Bldg., engrs. CD 12/24—ENR 1/13.

N. Y., Fort Edward—Village, emergency water supply pipeline, **$30,000.**

N. Y., Oyster Bay—Hicksville Water Dist., Oyster Bay, plans underway water main exten. **$25,350.** State Aid Planning Funds allotted.

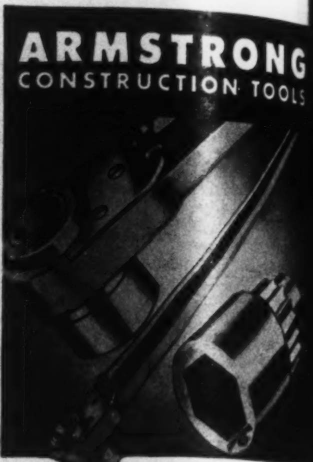
N. C., Hickory—Town, W. Lyerly, mayor, enlarging water filtering plant. Wm. C. Olsen, 5 Exchange Pl., consult. engr.

O., Sandusky—City, plans 35% completed, water distr. main exten. and general sys. imprvs. **$131,000.** Financing not yet provided for. R. R. Smith, city engr.

Utah, Logan—Logan City Corp., 180 N. Main St., exten. watermains and replacing small lines, **$45,821**; plans 80% completed water service meters and Booster pump for College Hill and line exten., **$23,300.** E. U. Moser, Box 87, engr.

N. B., St. John—Parish of Simonds, R. McAllister, warden, St. John, WW exten. **$40,000.**

ARMSTRONG
CONSTRUCTION TOOLS



ARMSTRONG
DROP FORGED
CONSTRUCTION RATCHET

The ARMSTRONG Reversible Ratchet Constru
Wrenches are made of steel thruout—the Ratch
are drop forged, the Nut Socket machined from spe
analysis bar steel. All parts except the handle
hardened. The spindle of the Ratchet is of "wide o
design—permits bolt to pass thru the Ratchet so
nuts can be run any distance along bolt and seco
set with one setting. 24" or 36" Ratchets take sq
or hexagonal sockets for nuts of from 1" to 2⅛" dia
1⅝" to 3⅛" dia., respectively.

Write for Catalog

ARMSTRONG BROS. TOOL C
"The Tool Holder People"
N. FRANCISCO AVE CHICAGO
199 Lafay

KEEP YOU
CONVEYO
BELTS GOIN

FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

● Avoid shutdowns
lengthen the life of
conveyor belts and b
elevator belts by
Flexco belt fasteners. T
sands of companies
stepped up the per
ance of conveyor lines
cut costs by using F
methods.

Bulletin F-100 shows
actly how to make tight
joints in conveyor
with Flexco.
Also illustrates step by step the latest practice in repairing rips and putting in patches.

FLEXIBLE STEEL LACING CO.
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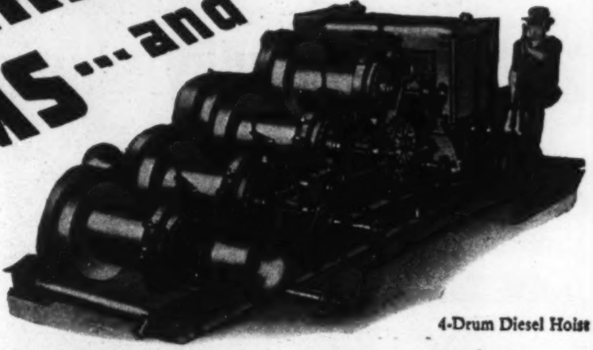
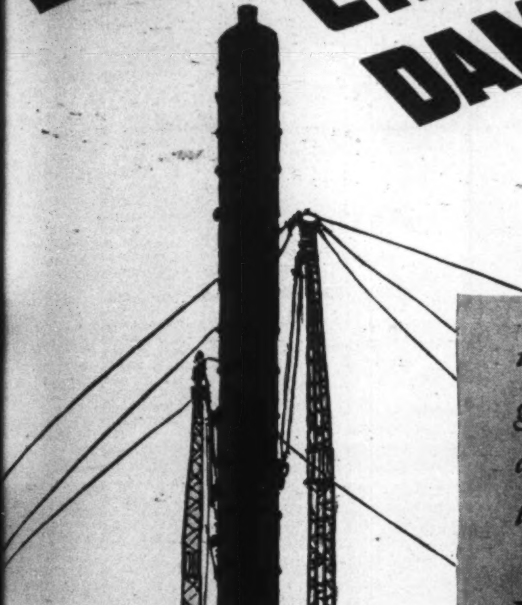
FLEXCO HD BELT FASTEN

Sold by supply houses everywhere

BUILDING BRIDGES - VIADUCTS, CRACKING TOWERS, DAMS ... and



4-Drum Diesel Hoist



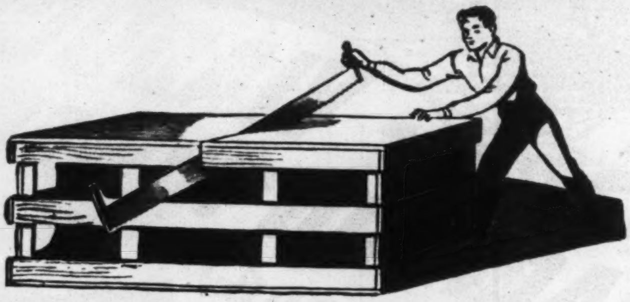
Boiler Type Hoist

in every field of construction where ruggedness and downright reliability are demanded, Lidgerwood has never failed to keep faith with the man on the job.

Wherever the situation calls for hoisting, there is a LIDGERWOOD electric, steam, gasoline or Diesel powered hoist to do the job efficiently and dependably. For LIDGERWOOD hoists are *built right*—with a background of more than 71 years experience in building good hoists.

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS • ELIZABETH E, NEW JERSEY

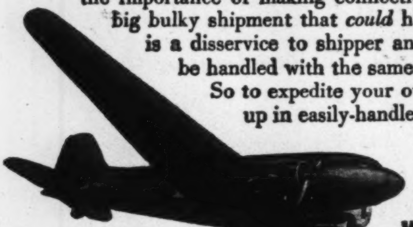
For faster handling
by AIR EXPRESS



divide bulky shipments

into smaller units

THE handling, loading, and unloading of AIR EXPRESS shipments is a speedy operation. Crews are well-trained and skillful. They know and appreciate the importance of making connections, quick delivery. That is why a big bulky shipment that *could* have been broken into smaller units is a disservice to shipper and receiver alike. It simply cannot be handled with the same speed given to ordinary shipments. So to expedite your own shipments be sure they're made up in easily-handled units whenever possible.



A Money-Saving, High-Speed
Wartime Tool For Every Business

As a result of increased efficiency developed to meet wartime demands, rates have been reduced. Shippers nationwide are now saving an average of more than 10% on Air Express charges. And Air Express schedules are based on "hours", not days and weeks—with 3-mile-a-minute service direct to hundreds of U.S. cities and scores of foreign countries.

WRITE TODAY for "North, East, South, West"—an informative booklet that will stimulate the thinking of every executive. Dept. PR-9, Railway Express Agency, 230 Park Avenue, New York 17, N. Y., or ask for it at any local office.

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Gets there FIRST

Phone RAILWAY EXPRESS AGENCY, AIR EXPRESS DIVISION
Representing the AIRLINES of the United States

SEWERS, WASTE DISPOSAL

Conn., Milford—Town Bd. Selectmen, Town Hall, garbage and rubbish incinerator. **$100,000.** V. B. Clarke, 356 Main St., Ansonia, engr.

★**Ill., East St. Louis**—East Side Levee & Sanitary Dist., B. O. Cooper, pres., 623A Missouri Ave., storm water pump. station with necessary equip., accessories, appurtenances etc. **$500,000.**

Ind., Frankford—Bd. P. Wks., A. R. Lucas, mayor, chr., P. Hufford, secy., City hall, sewage treatment plant and sewer sys., **$400,000.** Chas. Hurd, 1039 Architects & Builders Bldg., Indianapolis, Zone 4, consult. engr. Financing not yet provided for. CD 12/3—ENR 12/9.

★**Ind., Muncie**—City, rebuild, extend sewer sys., Normal City and Neely and Riverside Addn., **$600,000.** H. Morrison, city engr. CD 11/26—ENR 12/2.

Ind., New Castle—City, plans 25% completed 18 St. relief sewer and rebuilding Bowery Brook, **$50,000;** main sector of Bowery Brook with concrete mix. **$50,000.**

Ind., New Castle—Bd. P. Wks., S. E. Baker, mayor, chr., P. Scott, secy., City Hall, sewage treatment plant and sewer sys., **$200,000.** Chas. Hurd, 1039 Architects & Builders Bldg., Indianapolis, Zone 4, consult. engr. E. L. Guyer, City Hall, city engr. Financing not yet provided for. CD 3/27—ENR 4/6.

★**Mich., Detroit**—City Dpt. P. Wks., City Hall, plans 91% completed, 2.4 mi. concrete cylindrical Sect. A, McNichols-Seven Mile Sewer designated Six mile-Seven Mile Rd., Van Dyke Relief arm, **$2,400,000;** plans 57% completed 6 mi. concrete cylinder in tunnel Sect. B, McNichols-Seven Mile Rd. Relief sewer Hamilton Ave. and 6 St. relief outlets to Detroit River, **$6,000,000;** plans 87% completed 5.7 mi. concrete sewer in tunnel Sect. C, McNichols-Seven Mile Rd. Relief Sewer, Conant and Mt. Elliott Aves. to Detroit River, **$5,700,000;** plans 81% completed 2.3 mi. Sect. D, McNichols-Seven Mile Road Relief Sewer, **$2,300,000;** plans 75% completed Southfield Interceptor, 3.75 mi. 10 in. concrete sewer convering 40 sq. miles in Northwest Section, **$3,200,000;** plans 60% completed, addnl. incinerator capacity providing 1,400 to 2,400 tons capacity for Northwest Section and for St. Jean incinerator, **$720,000;** plans completed storm and sanitary sewers in river front area between Detroit River and interceptor sewer, **$400,000;** plans 10% completed Bluehill Pump. Station, incl. necessary inlet and discharge conduits providing adequate outlet for Rivard Sewer Sys., at Mack and Bluehill Aves., **$838,000;** plans 20% completed Fox Creek Sewer Section I, incl. enlarging outlet of Fox Creek from Jefferson Ave. to Detroit River, **$2,700,000.** G. R. Thompson, city engr.

★**Mich., Detroit**—Dpt. P. Wks., City Hall, plans 36% completed for electrification of Fairview Pump. Station, for storm water sewage, **$745,000.** Geo. R. Thompson, city engr. CD 7/31—ENR 8/10 under Uncl.

Mich., Detroit—City Dpt. P. Wks., City Hall, plans 18% completed River Rouge regulators in connection with River Rouge sewer, **$255,000.** G. R. Thompson, City Hall, city engr. CD 3/30/43—ENR 4/1/43.

Mich., Grosse Pointe Shores—Village, 795 Lake Shore Rd., plans underway sanitary sewers for system exten. **$150,000.** Mason L. Brown & Son, 120 Madison Ave., Detroit, consult. engrs.

Mich., Olivet—City, E. W. Corey, pres., making survey sewage disposal sys. Shoecraft, Drury & McNamee, Ann Arbor, consult. engrs.

★**Mo., Clayton**—St. Louis Co., County Court, Court House, storm and sanitary sewers in various incorporated areas, **$6,000,000.** R. Jablonsky, co. engr.

Mo., Farmington—City, plans completed sewer exten. and disposal plant addn. **$100,000.** B. F. Walther, city engr.

Mo., Glendale (br. St. Louis, 19)—City, C. H. Leslie, mayor, City Hall, 424 N. Sappington Rd., Zone 19, storm water sewerage sys. **$300,000.**

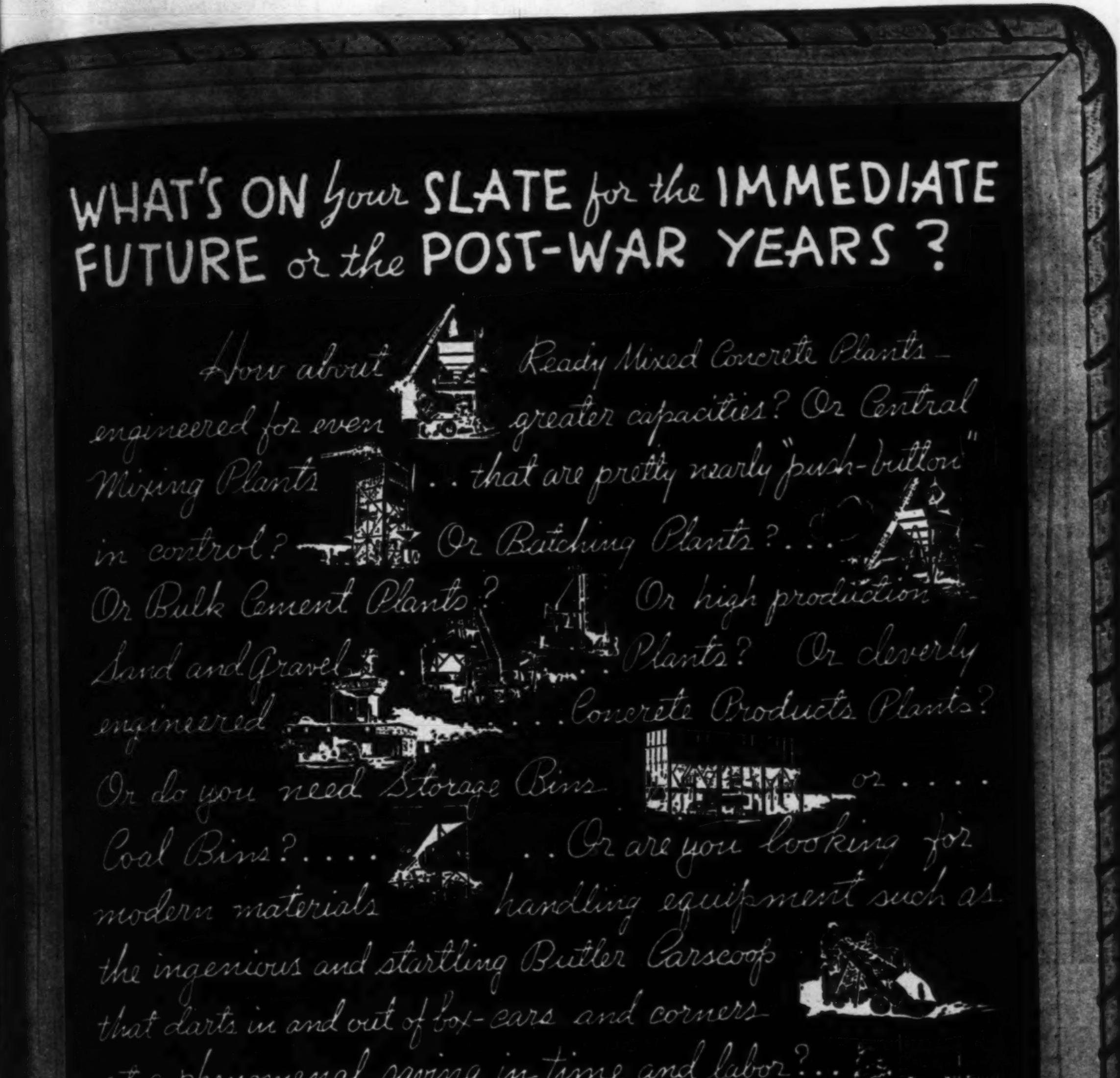
★**Mo., Kirkwood (St. Louis, 22)**—City, A. S. Kinyon, mayor, City Hall, 139 Southwood St., exten., imprv. sewage disposal plant with equip., imprvs. to sanitary sewerage sys., and exten., imprv. WW sys. **$1,000,000.**

Mo., Ladue (St. Louis, 5)—City, B. O. Rodes, mayor, 9345 Clayton Rd., development complete storm water sewerage sys. **$350,000.**

Mo., Rolla—City, storm concrete box sewer. **$50,000.** J. F. Kilpatrick, city engr.

★**Mo., St. Louis**—City, c/o M. M. Kinsey, pres. Bd. P. Serv., 304 City Hall, 12 and Market Sts., Zone 3, voted $7,957,000 bonds constructing, reconstructing, repairing, imprv. sewers and drains. $43,000 available. Total **$8,000,000.** CD 6/23—ENR 7/13.

Mo., University City (br. St. Louis, —City, W. A. Heimbuecher, city engr. City Hall, University City, St. Louis, Zone 6801 Delmar Blvd., rubbish incinerator with equip. **$50,000.**



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POSTWAR PROJECTS (Cont'd.)

N. Y., Brentwood—Dpt. P. Wks. State Office Bldg., Albany, Zone 1, plans completed sewage disposal plant, Proj. MH-67, **$440,000;** sewage disposal, sanitary, heating and electric work, Proj. 65 and 66, **$87,5** both at Edgewood State Hospital, for Dpt. Mental Hygiene, State Office Bldg., Albany, Zone 1, Div. Construction, Div. Architecture, C. J. White, comr. Architecture, State Office Bldg., Albany, Zone 1, engr.

★**N. Y., Brooklyn**—President Brooklyn Boro, Boro Hall, plans underway sewers, Evergreen Ave., Putnam Ave. to point 5 ft. south of Weirfield St., PBS-289, **$200,00** Evergreen Ave. between Moffat St. and point 50 ft. south of Weirfield St., PBS-29 **$200,000;** Greene Ave. between Central Ave. and Bushwick Ave., Central Ave. between Himrod St. and DeKalb Ave., Bushwick Ave. between Koscuisko St. and DeKalb Ave., Kosciusko St. between Bway and Bushwick Ave., PBS-307, **$200,000;** Evergreen Ave. between Linden and Woodbine Sts., Woodbine St. between Evergreen Ave. and Bway., Bway. between Woodbine and Monroe Sts., Monroe St. between Bway. and Ralph Ave., Ralph Ave. between Gates Ave. and Madison St., Gates Ave. between Bushwick Ave. and Bway., Grove St. between Goodwin Place and Bushwick Ave., Evergreen Ave. between Greene Ave. and Himrod St.; PBS-306, **$192,900;** Wilson Ave. between Eldert and Chauncey Sts., Knickerbocker Ave. between Cooper and Chauncey Sts., Irving Ave. between Gates Ave. and Grove St., Ridgewood Place, Madison and Woodbine Sts., Woodbine St. between Ridgewood and Irving Aves., PBS-305, **$128,800;** Wilson Ave. between Woodbine and Eldert Sts., Eldert St. between Knickerbocker and Central Aves., Knickerbocker Ave. between Eldert and Court Sts., Central Ave. between Eldert and Halsey Sts., PBS-304, **$198,100;** Eldert St. between Evergreen and Hopkinson Aves., Macon St. between Hopkinson and Saratoga Aves., Saratoga Ave. from Macon St. to point 125 ft. south of Macon St., PBS-301, **$200,000;** Flushing Ave. between Noll St. and Knickerbocker Ave., Noll St. between Flushing and Central Aves., Wilson Ave. between Flushing Ave. and Noll St., Central Ave. between Flushing Ave. and George St., Forrest St. between Central and Evergreen Aves., Evergreen Ave. between Noll and Monteith Sts., Monteith St. between Evergreen and Bushwick Aves., Stanwix St. between Noll and Monteith Sts., Bushwick Ave. between Forrest and Monteith Sts., PBS-302, **$168,800;** Melrose St. between Wilson and Evergreen Aves., Central Ave. between Jefferson Ave. and Melrose St., Evergreen Ave. between George St. and Willoughby Ave., Troutman St. between Evergreen and Bushwick Aves., Melrose St. between Stanwix St. and Evergreen Ave., PBS-301, **$150,300;** Bushrwick Ave. between Suydan St. and Myrtle Ave., Bushwick Ave. between Cedar St. and DeKalb Ave., Evergreen Ave. between Hart and Suydam Sts., Suydam St. between Evergreen Ave. and Bway., Bway. between Suydam and Hart Sts., Hart St. between Bway and Stuyvesant Ave., Myrtle Ave. between Bushwick Ave. and Ditmas St., Stuyvesant Ave. between Pulaski and Vernon Sts., PBS-300, **$172,40** Stanhope St. between Central and Evergreen Aves., Hart St. between Wilson and Evergreen Aves., Evergreen Ave. between Hart and Cedar Sts., Cedar St. between Evergreen Ave. and point 360 ft. west of Evergreen Ave., PBS-299, **$200,000;** Irving Ave. from Hart to Grove Sts., Palmetto St. from Knickerbocker to Irving Aves., Harmon St from Irving to Wyckoff Aves., PBS-29 **$200,000;** Thomas St. from Knickerbocker Ave. to Melrose St., PBS-295, **$200,00** Irving Ave. from Melrose St. to Willoughby Ave., PBS-296, **$200,000;** Irving Ave. from Willoughby Ave. to point 30 ft. south of Hart St., Suydam St. from Irving to St Nicholas Aves., PBS-297, **$200,000;** Knickerbocker Ave. from Melrose St. to point 7 ft. north of Suydam St., PBS-292, **$200,00** Knickerbocker Ave. from point 75 ft. north of Suydam St. to Menaham St., PBS-29 **$200,000;** Knickerbocker Ave. between Menahan and Hancock Sts., Hancock St. between Knickerbocker and Irving Aves., PBS-29

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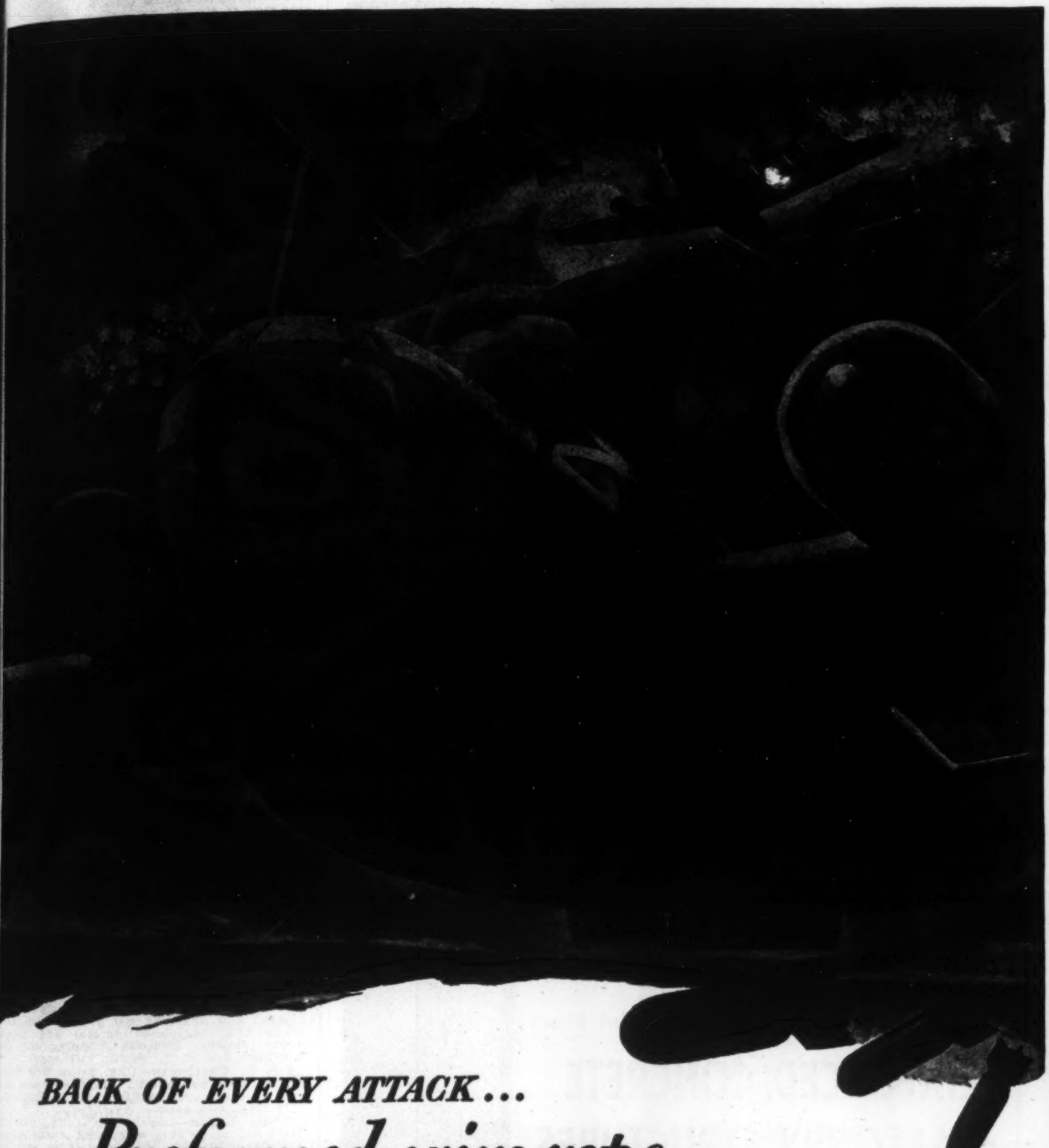

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POSTWAR PROJECTS (Cont'd.)

$190,700; Moffat St. between Bushwick and Central Aves., Central Ave. between Moffat and Pilling St., Bushwick Ave. between Moffat and Aberdeen Sts., Saratoga Ave. from point 125 ft. south of Macon to Bainbridge Sts., Hopkinson Ave. from Macon to Bainbridge Sts., PBS-291, **$195,900;** Melrose Ave. from point about 350 ft. north of Knickerbocker Ave. to Wilson Ave., Wilson Ave. from Melrose Ave. to point about 75 ft. south of Jefferson Ave., PBS-178, **$200,000;** Knickerbocker Ave. from Harrison Place to point about 120 ft. south of Gratten St., PBS-174, **$200,000;** Knickerbocker Ave. from point about 120 ft. south of Grattan St. to Flushing Ave., PBS-175, **$200,000;** Knickerbocker Ave. between Flushing and Melrose Aves., PBS-176, **$200,000;** Melrose Ave. from Knickerbocker Ave. to point about 350 ft. north of Knickerbocker Ave., PBS-177, **$200,000;** Outlet section, from head of English Kills across easement to Johnson Ave. and in Johnson Ave. westerly to point about 350 ft. east of Knickerbocker Ave., PBS-170, **$200,000;** Johnson Ave. from point about 350 ft. east of Knickerbocker Ave. to Knickerbocker Ave., PBS-171, **$200,000;** intersection of Johnson and Knickerbocker Aves., PBS-172, **$200,000;** Knickerbocker Ave. between Harrison Place and Johnson Ave., PBS-173, **$200,000;** Central Ave. from point 100 ft. south of Greene Ave. to Linden St., PBS-168, **$200,000;** Central Ave. between Linden and Woodbine Sts., Woodbine St. from Central Ave. to point 100 ft. north of Central Ave., PBS-167, **$200,000;** Woodbine St. from point 100 ft. north of Central to Evergreen Aves., Evergreen Ave. from Woodbine St. to Putnam Ave., PBS-169, **$200,000;** Wilson Ave. between Hermon St. and Greene Ave., from point 100 ft. north of Greene Ave. to Greene Ave., Greene Ave. between Wilson and Central Aves., Central Ave. between Greene Ave. and Bleecker St., from Greene Ave. to point 100 ft. south of Greene Ave., PBS-166, **$200,000;** Wilson Ave. from point about 75 ft. south of Jefferson Ave. to Willoughby St., PBS-162, **$200,000;** Wilson Ave. from Willoughby St. to point about 80 ft. north of DeKalb Ave., PBS-163, **$200,000;** Wilson Ave. from point about 30 ft. north of DeKalb Ave. to Stanhope St., PBS-164, **$200,000;** Wilson Ave. from Stanhope St. to point about 75 ft. north of Greene Ave., PBS-165, **$200,000.** State Aid Planning Funds allotted. P. P. Farley, al. consult. engr. Brooklyn Boro.

N. Y., Buchanan—Village, drainage and sewage disposal sys. **$150,000.**

N. Y., Fort Edward—Village, sewage disposal plant and intercepting sewer. **$120,000.**

N. Y., New York—President Bronx Boro, 851 Grand Concourse, plans underway sewers E. 233 St. from DeReiner Ave. to Grenada Place and in Grenada Place to Laconia Ave., PXS-19, **$52,000;** E. 166 St., Webster to College Aves. PXS-21, **$30,000;** Morris Ave. from Park Ave. to 163 St., PXS-88, **$200,000;** Park Ave., Morris Ave. to 138 St., PXS-89, **$200,000.** State Aid Planning Funds allotted. T. B. Dyer, ch. engr. Bronx Boro.

O., Columbus—City, J. Rhodes, mayor, City Hall, install. 2 incinerator units at Municipal Garbage Disposal plant, **$275,000-$300,000.** P. W. Maetzel, City Hall, city engr.

★**O., Newark**—City, plans underway, sewage treatment plant and main intercepting sewer, **$500,000;** miscellaneous sewers, **$100,000;** Holler Ditch trunk sewers, **$130,000.** C. H. Wells, City Hall, city engr.

O., Sandusky—City, incinerator and sewerage sys. imprvs., **$269,000,** land rights not cleared and financing not yet provided for; plans 15% completed lateral and trunk sewer imprvs., **$200,000,** financing not yet provided for. R. P. Smith, city engr.

★**S. C., Charleston**—City, plans 25% completed sewer exten., **$737,535;** plans exten. sewerage sys., **$425,000.** B. M. Thomson, City Hall, city engr.

Utah, Logan—Logan City Corp., 180 N. Main St., plans 50% completed storm sewer, **$47,304;** plans 25% completed exten. existing sewer lines and adding pump. plant, **$38,689.** E. U. Moser, Box 87, engr.

★**Wis., Milwaukee**—Metropolitan Sewerage Comn. of Milwaukee Co., Jones Island, Milwaukee, main sewer extens., **$600,000;** sewage disposal plant exten., imprvs., **$4,000,000.** Jas. L. Ferebee, ch. engr. and genl. mgr.

★**Wis., Superior**—City, R. E. McKeaque, clk., City Hall, plans underway sewage disposal plant, **$500,000;** plans completed sanitary sewers, **$25,000;** storm sewers, **$75,000.**

N. B., St. John—Parish of Lancaster, E. C. Seeley, councillor, St. John, sewers. **$275,000.**

N. B., St. John—Parish of Simonds, R. McAllister, warden, St. John, sewer exten. **$60,000.**

★**Ont., Toronto**—City, F. J. Conboy, mayor, sewer installations, repairs. **$13,653,983.**

BRIDGES

★**†California**—Pub. Roads Admin., Phelan Bldg., San Francisco, plans 90% completed Nevada City-Downieville (Goodyear Creek Bridge and approaches), 0.3 mi. bridge, grading, bituminous surfacing. Sierra Co., **$40,000;** 4.8 mi. Truckee-Hobart (Sage Hen Saddle-Prosser Creek), Nevada Co.,

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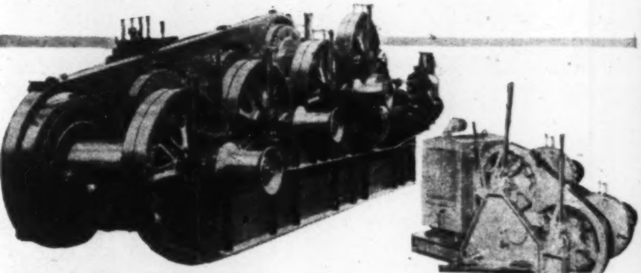

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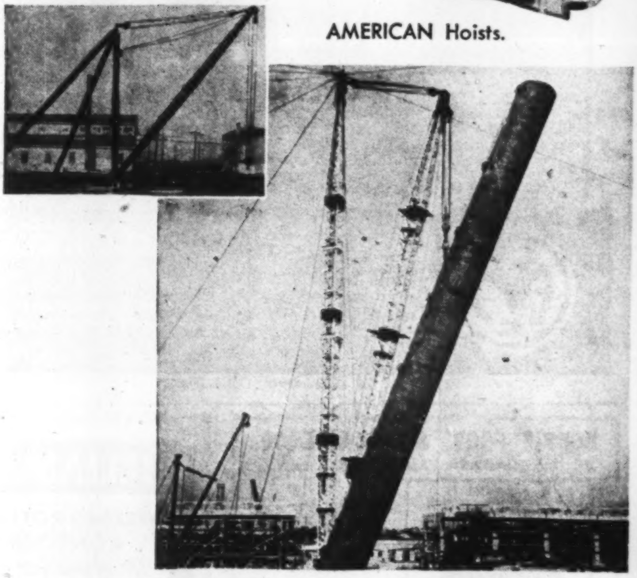

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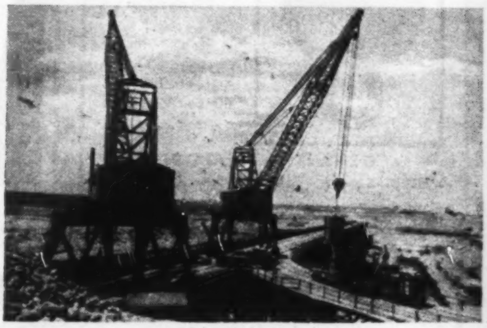

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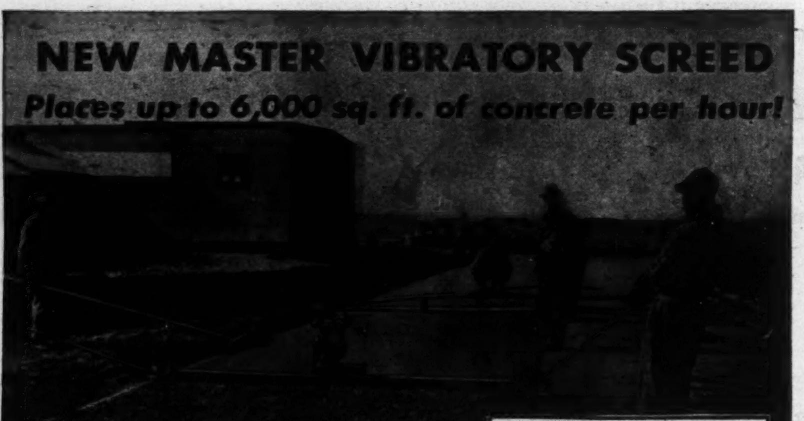

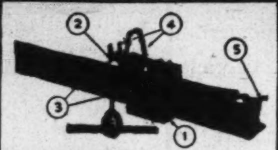

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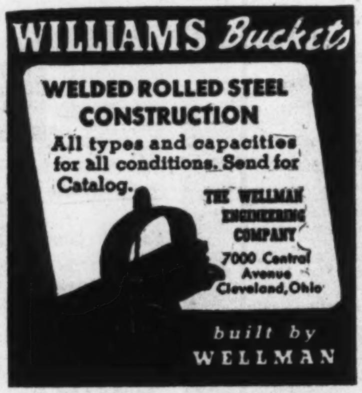

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POSTWAR PROJECTS (Cont'd.)

$212,000; plans 50% completed 0.8 mi. Hoopa-Weitchpec (Klamath River Bridge and approaches). Humboldt Co., $260,000; 12 mi. Big Oak Flat (Park Bdry.-Colfax Gate), Tuolumne Co., $670,000; plans 60% completed 5.8 mi. June Lake-Silver Lake, Mono Co., $265,000; plans 75% completed 27 mi. Feather Lake (Hog Fat-Poison Lake), Lassen Co., $673,000; plans 15% completed 8 mi. Blairsden-Capline, Plumas Co., $356,000.

Kan., Topeka—City, E. L. Knap, clk., City Hall, widening Melan Bridge. $100,000. W. E. Baldry, city engr.

★**Mo., St. Louis**—City, c/o M. M. Kinsey, pres. Bd. P. Serv., 304 City Hall, 12 and Market Sts., Zone 3, voted $1,778,000 bonds, constructing, reconstructing, replacing, repairing bridges, viaducts, underpasses and approaches thereto, etc. $507,000 available. Total $2,285,000. CD 6/23—ENR 7/13.

★**New Hampshire**—State Hy. Dpt., Concord, one 40 ft. and one 600 ft. bridges in Exeter, $400,000; rein.-con. bridge, in Durham, $50,000; bridge in Dublin, $100,000; 250 ft. concrete bridge in Conway, $150,000; 2 concrete, steel bridges in Milford and Brookline, $200,000.

★**O., Canton**—Stark Co., Canton, plans completed constructing, repairing 32 bridges. $678,328. Financing provided for. H. C. Frank, 203 Market St. S., archt. L. Zerbe, Court House, co. engr.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, imprv. Rochester - Bridgewater Bridge, Route 68, $214,000, Brighton-Beaver Falls Bridge, Route 18, $802,000, both Beaver Co. Financing not yet provided for. Michael Baker, Jr., Rochester, consult. engr.

Alta., Edmonton—Dominion Govt., Ottawa, Ont., low level bridge. $250,000. Dpt. P. Wks., Ottawa, Ont., engr.

N. B., Brookville—Canadian Natl. R. R. Co., H. A. Dixon, ch. engr., 360 McGill St., Montreal, Que., straightening, widening subway. $75,000.

N. B., Fairville—Canadian Pacific R. R. Co., J. E. Armstrong, ch. engr., Montreal, Que., grade separation at Main St. and Bay Shore line. $100,000.

N. B., St. John—Canadian Pacific R. R. Co., J. E. Armstrong, ch. engr., Montreal, Que., widening, straightening subway at Chesley St. $100,000.

N. B., St. John—Municipality and Canadian Natl. R. R., H. A. Dixon, ch. engr., 360 McGill St., Montreal, Que., eliminating grade crossing at Haymarket Sq. $225,000.

N. B., St. John—Municipality, grade separation at Wall-Garden and City Roads. $200,000.

STREETS AND ROADS

★**†Arizona**—Pub. Roads Admin., 18 and F Sts. N.W., Wash., 25, D. C., plans 10% completed grading, bituminous surfacing 15 mi. Grand Canyon-Williams, $750,000; 20 mi. Grand Canyon-Williams, $900,000; plans to be started 5.9 mi. south of Flagstaff toward Mormon Lake, $200,000; plans 70% completed 11 mi. Flagstaff East (Cliffs-Winona), $470,000; plans 10% completed 15 mi. Ashfork-Williams (County Line-Williams), $1,000,000, all foregoing Coconino Co.; plans 80% completed 1.7 mi. Ashfork-County Line, Yavapai Co., $76,500; plans 100% completed 2.9 mi. Pine-Pine Junction, both Gila Co., $123,000; plans 60% completed 5.1 mi. Pine-South, $175,000, both Gila Co.; plans 70% completed 13.1 mi. Mogollon-Rim-Clints Wells, $590,000; plans 90% completed grading, bridge and bituminous surfacing 5.2 mi. Payson-Colcord Mountain, $115,000, both Coconino Co.; plans 80% completed 6.6 mi. Alpine-County Line, Alpine Co., $195,000; grading, bituminous surface reconstruction 17 mi. Grand Canyon-Williams, Coconino Co., $850,000.

★**†California and Arizona**—Pub. Roads Admin., Phelan Bldg., San Francisco, Calif., plans 90% completed grading, oil stabilization 4.48 mi. Tioga Rd.; Tenaya Creek-Cathedral Creek, $227,000; 4.22 mi. Tioga Rd.; Porcupine Summit-Snow Creek, $246,800; plans 85% completed 8.04 mi. Tioga Rd., McSwain Meadow-Porcupine Summit, $600,000; 3.4 mi. Tioga Rd., Snow Creek-Tenaya Lake, $265,500; plans 50% completed guardrail, 2.36 mi. Wawona, Big Oak Flat, Tioga and Glacier Point Roads, $25,000 all foregoing in Yosemite National Park; plans to be started widening, general imprv. 30 mi. Loop Hy., SW entrance-NW entrance, Lassen National Park, $469,000; plans 100% completed bituminous surfacing 15.17 mi. Pierce Ferry-So. Boundry, Boulder Dam National Recreation Area, $88,000; plans 85% completed reconstruction, grading and bituminous surfacing 17 mi. Grapevine-Desert View, Grand Canyon National Park, $515,000; plans 30% completed 12 mi. Grand Canyon Village-Grapevine, Grand Canyon National Park, $89,500; plans 85% completed

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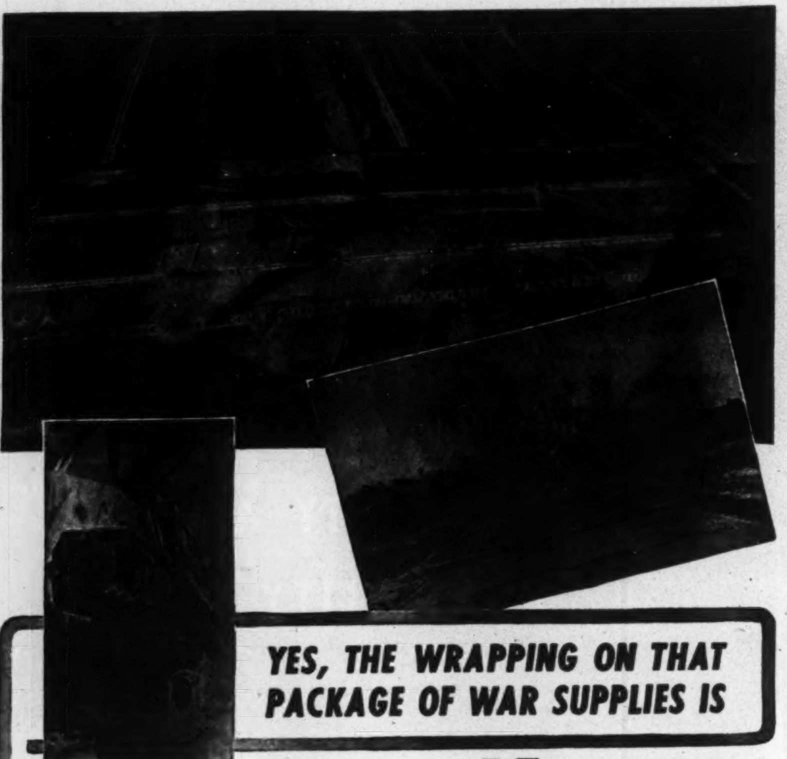

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POSTWAR PROJECTS (Cont'd.)

grading, bituminous surfacing 10 mi. West Entrance-Ruins, Wupatki National Monument, **$250,000**; plans 50% completed 3 mi. same road, **$120,000**; plans 25% completed 1.1 mi. Nevada City-Downieville (1 mi. North Indian Creek to North Fork Yuba River), Sierra Co., Calif.; **$90,000**; 3.8 mi. Nevada City (Indian Creek-Yuba County Line), Sierra Co., Calif., **$135,000**; 4.8 mi. Nevada City (Middle Fork Yuba-Wilson), Yuba Co., Calif., **$265,000**; 21 mi. Almanor (Paxton-Lake Almanor) Plumas Co., Calif., **$420,000**; 8 mi. Carson Pass (Cooks Station-Lumber Yard Ranger Sta.) Amador Co., Calif., **$325,000**; 3.8 mi. Harmony Ridge (Vicinity Summit-Vicinity Bear River), Nevada Co., **$325,000**; plans 100% completed 3.4 mi. Tahoe-Brockway, Placer Co., Calif., **$172,000**; 2.7 mi. U.S. 50 (Echo Summit-Upper Truckee River), Eldorado Co., Calif., **$200,000**; 3 mi. Feather Lake (Old Station-Rim), Shasta Co., Calif., **$155,000**; plans 75% completed 4 mi. U.S. 50 (Pollock Pines-Fresh Pond), Eldorado Co., Calif., **$475,000**; 3 mi. Western Divide (Frog Meadow-Lion Ridge), Tulare Co., Calif., **$155,000**; 9 mi. Feather River (Susanville-Hog Flat), Lassen Co., Calif., **$270,000**; 8.9 mi. Feather River (Rim-Poison Lake), Lassen Co., Calif., **$180,000**; plans 50% completed 2.3 mi. San Marcos Pass, Santa Barbara Co., Calif., **$230,000**; 5 mi. Meyers-Mays, Eldorado Co., Calif., **$300,000**; 6 mi. Sonora Pass (Bumblebee Creek-Cascade Creek), Tuolumne Co., Calif., **$300,000**; plans 60% completed 2.6 mi. Grant Lake-U.S. 395, Mono Co., Calif., **$50,000**; 8.5 mi. Forest Ranch-Loma, Butte Co., Calif., **$325,000**; 5.5 mi. Western Divide (Lion Ridge-Double Bunk), Tulare Co., Calif., **$410,000**; plans 85% completed 12 mi. Greenhorn Summit-Frog Meadow, Kern and Tulare Counties, Calif., **$583,000**; plans 30% completed 11.5 mi. Ebbetts Pass (Dorrington-Gans Meadow), Calaveras Co., Calif., **$540,000**; plans 90% completed 5.2 mi. Big Pines Park-Vincent Divide, San Bernardino Co., Calif., **$550,000**; plans 80% completed 8.5 mi. Mt. Pinos, Kern and Ventura Counties, Calif., **$318,000**; plans to be started 6 mi. Mill Creek-Camp Angelus, San Bernardino Co., Calif., **$800,000**. CD 1/12—ENR 1/27.

Ill., Jacksonville—City, City Hall, plans 90% completed concrete paving approx. 3,600 ft. Arterial Streets 9, 11, 19, 14, 6, 13, 3 and 12 in Lake Dist. **$122,261**. W. W. Polk, Centennial Bldg., Springfield, ch. state hy. engr. K. Stapleton, city engr.

★**Ind., Anderson**—Madison Co., Hy. Dpt., Anderson, resurfacing, paving farm to market roads; **$1,500,000**. C. V. Windsor, co. surveyor. engr.

Minn., Minneapolis—City, C. Swanson, clk., will remove present wood-block and asphalt concrete resurfacing Como Ave. between 22nd Ave. S.E. and city limits by day labor. **$57,000**. F. T. Paul, city engr.

Mo., Clayton—St. Louis Co., c/o County Court, Court House, Clayton, St. Louis, Zone 5, grading, imprv. hy. from University City to Creve Coeur Lake, **$238,000**; plans completed 4 major highway projects incl. cutoff relieving Natural Bridge road in Pinelawn area, exten. Pennsylvania Ave., St. Charles to Natural Bridge road, continuation of Delmar Blvd. western edge of University City to Lindbergh Blvd., and road to facilitate flow of traffic to new bridge over Mississippi River near Jefferson Barracks, **$118,000**. R. Jablonsky, Co. engr.

Mo., Glendale (br. St. Louis, 19)—City, C. H. Leslie, mayor, City Hall, 424 North Sappington Rd., street imprvs. **$225,000**.

★**Mo., Maplewood (br. St. Louis, 17)**—City, J. Usher, city clk., 7482 Manchester Ave., street and road imprvs., etc. **$515,000**.

Mo., Rolla—City 8 to 10 mi. concrete paving and asphaltic black top surfacing, etc. **$255,000**. J. E. Kilpatrick, city engr.

★**Mo., St. Louis**—City, c/o M. M. Kinsey, pres. Bd. P. Serv., 304 City Hall, 12 and Market Sts., Zone 3, voted $7,820,000 bonds, establishing, opening, widening, constructing, reconstructing, paving, repaving streets, highways, parkways, blvds., and alleys. $780,000 available. Total **$18,600,000**. CD 6/23—ENR 7/13.

★**Mo., University City (br. St. Louis, 5)**—City, W. A. Heimbuecher, city engr., City Hall, University City, St. Louis, Zone 5, 6801 Delmar Blvd., new street projects, imprv. present streets and sewers. **$730,000**.

★**†Nevada**—Pub. Roads Admin., 18 and F Sts. N.W., Wash., 25, D. C., plans 35% completed grading, bituminous surfacing 4.6 mi. Owyhee River (Indian Bdry.-South) **$126,500**; plans 20% completed imprv., bituminous surfacing 14.5 mi. Owyhee River (Johnson Ranch-Patsville, **$154,000**, both Elko Co.; plans 30% completed grading, bituminous surfacing 18 mi. Dalzell Canyon (Calif. Bdry.—6 mi. south of Wellington), Lyon Co., **$550,000**. CD 1/12—ENR 1/27.

★**New Hampshire**—State Hy. Dpt., Concord, constructing 30 mi. hys. in towns of Brookline, Exeter, Durham, Dublin, Harrisville, Chesterfield, Conway and Milford. **$1,200,000**.

★**New York**—Dpt. P. Wks., Albany, Zone 1, preliminary plans underway center curbing for Long Island State Parkways, Nassau and Suffolk Counties, Con. 75, **$725,000**. Long Island State Park Comn., Babylon, consult. engrs. Div. Construction, State Office Bldg., Albany, Zone 1, engrs.

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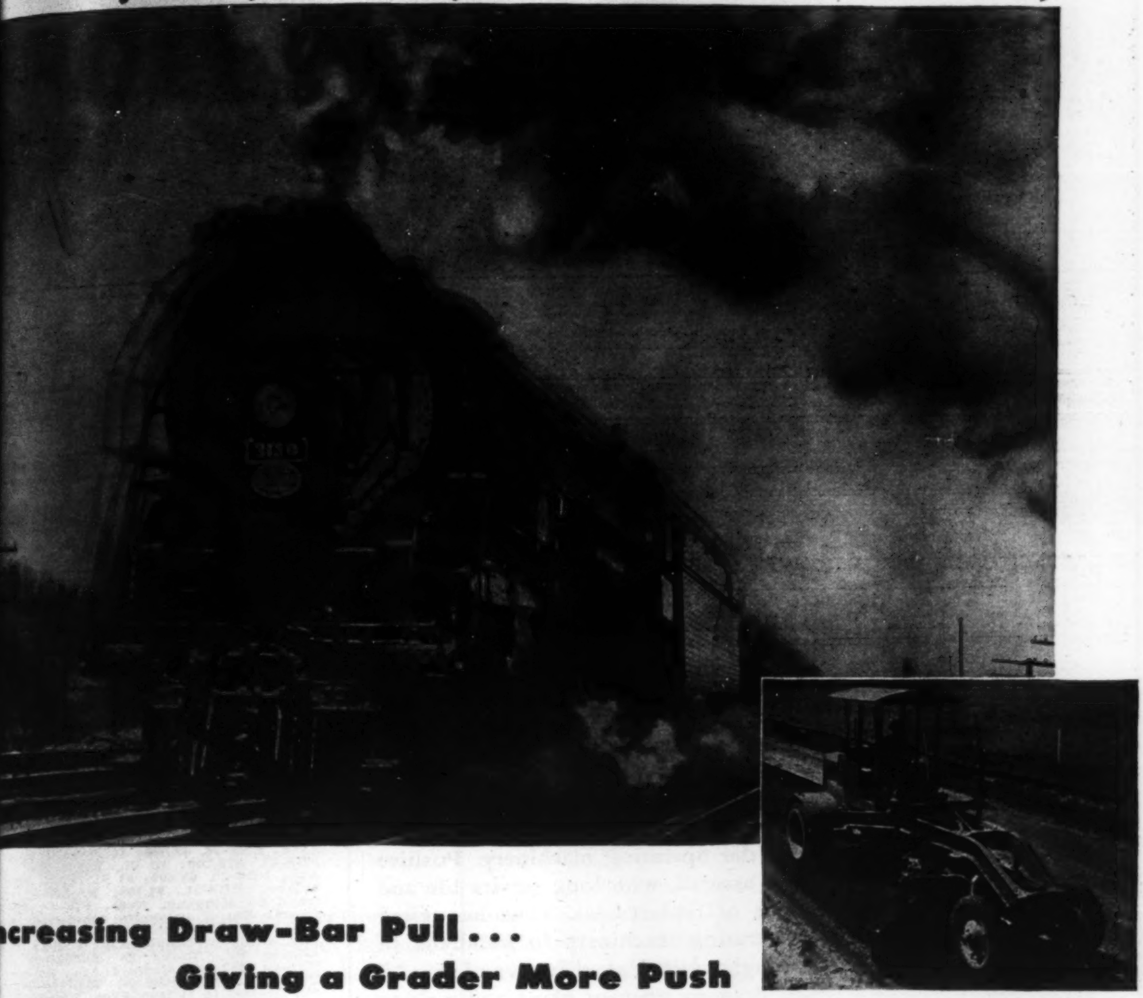

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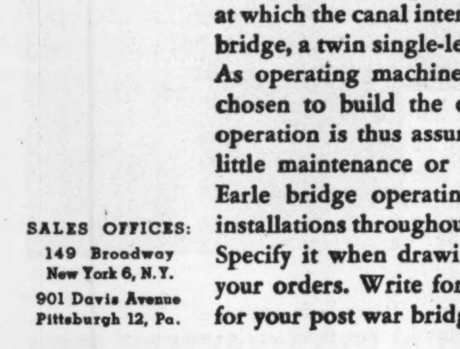
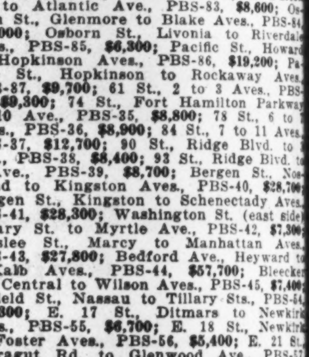
POSTWAR PROJECTS (Cont'd.)

★ **N. Y., Brooklyn**—President Brookly
Boro, Boro Hall, plans underway re
paving Woodbine St., Central to Knicker
bocker Aves., PBS-27, $14,400; 4 Ave., 1
to 27 Sts., PBS-28, $50,000; 32 St., 3 to
Aves., PBS-29, $8,200; 35 St., 3 to 4 Aves.
PBS-30, $8,200; 45 St. 6 to 7 Aves., PBS 31
$8,700; 49 St., 2 to 3 Aves., PBS-32, $8,
54 St., 3 to 4 Aves., PBS-33, $8,300; Pros
pect Place, Roger to Nostrand Aves., PBS-
21, $9,500; Putnam Ave., Sumner to Lewi
Aves., PBS-22, $10,000; Ryerson Ave.
Flushing to Park Aves., PBS-23, $9,70
Seabring St., Van Brunt to Columbia Sts.
PBS-24, $13,900; Shepherd Ave., Glenmor
to Blake Aves., PBS-25, $21,000; Snyde
Ave., Nostrand to New York Aves., PBS
26, $12,500; Herbert St., Graham to Kings
land Aves., PBS-14, $15,000; Lincoln Ave.
Fulton St. to Atlantic Ave., PBS-15, $6,40
Lincoln Place, Nostrand to New York Aves.
PBS-16, $9,400; Marion St., Fulton St. t
Patchen Ave., PBS-19, $20,500; Macon St
Howard to Hopkinson Aves., PBS-18, $18,
700; Morrell St., Bushwick to Flushing Aves.
PBS-20, $11,000; Clarkson Ave., New York
Ave. to 75 ft. west of E. 49 St., PBS-7
$60,300; E. 17 St., Beverly to Dorcheste
Rds., PBS-8, $20,200; E. 18 St., Beverly t
Cortelyou Rds., PBS-9, $8,900; Essex St
Fulton St. to Atlantic Ave., PBS-10, $8,000
Granite St., Bway. to Long Island R.R., PBS-
12, $13,200; Hancock St., Howard Ave. t
Bway., PBS-13, $14,400; Aberdeen St., Bway
to Bushwick Ave., PBS-1, $7,200; Bay
Ridge Parkway, 19 to 20 Aves., PBS-2
$13,200; Bay 13 St., Bath to Cropsey Aves.
PBS-3, $7,900; Brooklyn Ave., Ave I t
Flatbush Ave., PBS-4, $13,700; Bushwick
Ave., Myrtle Ave. to Eastern Parkway Ex-
ten., PBS-5, $184,000; Chestnut St., Fulton
St. to Atlantic Ave., PBS-6, $7,800; Harmon
St., Knickerbocker to Irving Aves., PBS-68
$8,700; Hart St., Bway. to Central Ave.
PBS-70, $19,300; Huntington St., Clinton t
Smith Sts., PBS-71, $9,700; Irving St., Va
Brunt to Columbia Sts., PBS-72, $13,000
Jerome St., Jamaica Ave. to Fulton St., PBS-
73, $13,200; Keap St., Union Ave. to Grand
St., PBS-75, $11,300; Leonard St., Schole
St. to Bway., PBS-76, $22,000; Lynch St.
Harrison Ave. to Bway., PBS-77, $7,900
Middagh St., Columbia Hts. to Henry St.
PBS-78, $8,800; Milton St., West to Frank-
lin Sts., PBS-79, $5,100; Montauk Ave., Pit-
kin to Blake Aves., PBS-80, $16,900; Nelson
St., Columbia to Smith Sts., PBS-81, $23,000
New Jersey Ave., Sutter to Dumont Aves.
PBS-82, $12,400; Nicholas Ave., to Fulton
St. to Atlantic Ave., PBS-83, $8,600; Os-
born St., Glenmore to Blake Aves., PBS-84
$20,000; Osborn St., Livonia to Riverdale
Aves., PBS-85, $6,300; Pacific St., Howard
to Hopkinson Aves., PBS-86, $19,200; Pa-
cific St., Hopkinson to Rockaway Aves.
PBS-87, $9,700; 61 St., 2 to 3 Aves., PBS-
34, $9,300; 74 St., Fort Hamilton Parkway
to 10 Ave., PBS-35, $8,800; 78 St., 6 to
Aves., PBS-36, $8,900; 84 St., 7 to 11 Aves.
PBS-37, $12,700; 90 St., Ridge Blvd. to
Ave., PBS-38, $8,400; 93 St., Ridge Blvd. t
3 Ave., PBS-39, $8,700; Bergen St., Nos-
trand to Kingston Aves., PBS-40, $28,700
Bergen St., Kingston to Schenectady Aves.
PBS-41, $28,300; Washington St. (east side)
Tillary St. to Myrtle Ave., PBS-42, $7,300
Ainslee St., Marcy to Manhattan Aves.
PBS-43, $27,800; Bedford Ave., Heyward t
DeKalb Aves., PBS-44, $57,700; Bleecker
St., Central to Wilson Aves., PBS-45, $7,400
Suffield St., Nassau to Tillary Sts., PBS-54
$10,300; E. 17 St., Ditmars to Newkirk
Aves., PBS-55, $6,700; E. 18 St., Newkirk
to Foster Aves., PBS-56, $5,400; E. 21 St.
Farragut Rd. to Glenwood Ave., PBS-57
$10,000; Eckford St., Driggs to Engert Aves.
PBS-58, $6,500; Fenimore St., Flat-
bush to Bedford Aves., PBS-59, $12,500
Chauncey St., Reid to Patchen Aves., PBS-
48, $10,300; Chestnut St., Liberty to Pitkin
Aves., PBS-49, $9,800; Cook St., Bway t
Humboldt St., PBS-50, $11,800; Covert St.
Central to Wilson Aves., PBS-51, $7,500
Debevoise Place, Fleet St. to Flatbush Ave.
Exten., PBS-52, $6,000; Debevoise St., Gra-





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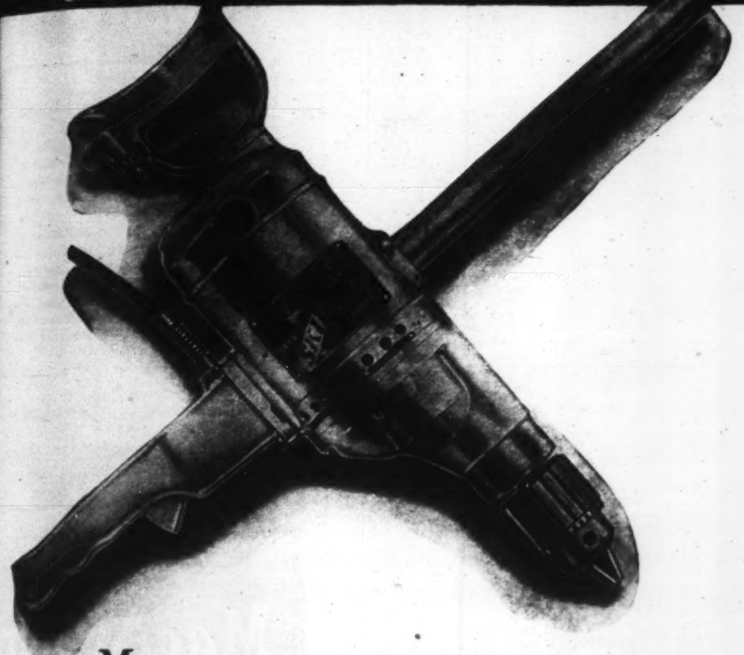

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POSTWAR PROJECTS (Cont'd.)

ham to Bushwick Aves., PBS-69, **$16,500**; Foster Ave., Ocean Parkway to Ocean Ave., PBS-660, **$65,900**; Georgia Ave., Liberty to Belmont Aves., PBS-61, **$15,200**; Grant Ave., Jamaica to Liberty Aves, PBS-62, **$47,900**; Greene Ave., Bushwick to Irving Aves., PBS-63, **$37,300**; Hampton Place, Park to St. Johns Places, PBS-66, **$5,700**; Harmon St., Evergreen to Wilson Aves., PBS-67, **$17,700**; Halsey St., Bushwick to Irving Aves., PBS-158, **$42,400**; Myrtle Ave., Washington to Jay Sts., PBS-159, **$12,300**; Putnam Ave., Fulton St. to Nostrand Ave., PBS-160, **$47,100**; 5 Ave., Atlantic to Flatbush Aves., PBS-161, **$5,400**; 7 Ave. 51 to 55 Sts., PBS-150, **$7,300**; Adams St., Concord to Willoughby Sts., PBS-153, **$24,500**; Boerum Pl., Livington St. to Atlantic Ave., PBS-154, **$10,100**; Gates Ave., Bushwick to Myrtle Aves., PBS-155, **$52,700**; Greene Ave., Fulton St. to Franklin Ave., PBS-156, **$63,600**; Halsey St., Nostrand Ave., to Bway., PBS-157, **$130,300**; Pilling St., Bway. to Evergreen Ave., PBS-139, **$6,000**; Schenck Ave., Jamaica to Atlantic Aves., PBS-140, **$7,700**; Weinfield St., Knickerbocker Ave. to L. I. Railroad, PBS-146, **$5,700**; W. 33 St., Neptune to Surf Aves., PBS-147, **$7,200**; Woodbine St., Knickerbocker Ave. to Ridgewood Pl., PBS-148, **$5,100**; 6 Ave. Bay Ridge Parkway to 80 St., PBS-150, **$9,600**; Putnam Ave., Ralph Ave. to Bway., PBS-121, **$7,000**; Rogers Ave., Empire Blvd. to Church Ave., PBS-127, **$85,200**; Rogers Ave., Foster Ave. to Farragut Rd., PBS-128, **$14,200**; 5 Ave., 9 St. to Prospect Ave., PBS-129, **$35,100**; Atlantic Ave., Washington to Bedford Ave., PBS-130, **$30,400**; E. 15 St., Avenue M to Ave. D, PBS-133, **$8,800**; Highlawn Ave., W. 12 to W. 8 Sts., PBS-134, **$8,400**; 96 St., Shore Rd. to Marine Ave., PBS-115, **$7,400**; Court St., Atlantic to Hamilton Aves., PBS-116, **$114,000**; Ave. C, McDonald Ave. to E. 3 St., PBS-117, **$7,400**; Chestnut St., Jamaica Ave. to Fulton St., PBS-118, **$9,700**; Congress St., Henry to Court Sts., PBS-119, **$5,300**; Powers St., Union to Manhattan Aves., PBS-120, **$7,000**; 34 St., 3 to 4 Aves., PBS-108, **$8,200**; 37 St., 3 to 4 Aves., PBS-109, **$8,100**; 48 St., 2 to 3 Aves., PBS-110, **$8,700**; 74 St., 15 to 16 Aves., PBS-111, **$8,600**; 79 St., 3 to 4 Aves., PBS-112, **$8,500**; 84 St., Ridge Blvd. to 400 ft. west of 3 Ave., PBS-113, **$5,900**; Watkins St., Liberty to Clenmore Aves., PBS-102, **$5,800**; Willoughby Ave., Tompkins to Throop Ave., PBS-103, **$9,900**; Wilson St., Kent to Wythe Ave., PBS-104, **$8,700**; 4 St., Hoyt to Bond Sts., PBS-105, **$6,600**; 20 St., 435 ft. west of 3 Ave. to 3 Ave., PBS-106, **$6,800**; 24 St., 3 to 4 Aves., PBS-107, **$8,100**; Snyder Ave., New York to Brooklyn Aves., PBS-95, **$12,300**; S. Elliott Pl., DeKalb Ave. to Hanson Pl., PBS-96, **$17,000**; St. Marks Ave., Buffalo to Ralph Aves., PBS-97, **$10,900**; Sutter Ave., E. 98 St., to Howard Ave., PBS-98, **$15,000**; Suydam St., Myrtle to Knickerbocker Ave., PBS-99, **$25,400**; Van Siclen Ave., Pitkin to Dumont Aves., PBS-100, **$24,000**; Waterbury St., Stagg to Meserole Sts., PBS-101, **$7,400**; Palmetto St., Central to Knickerbocker Aves., PBS-88, **$15,100**; Palmetto St., Irving to Myrtle Aves., PBS-89, **$7,800**; Prospect Place, Grand to Classon Aves., PBS-90, **$11,700**; Provost St., Pardge Ave. to Green St., PBS-91, **$14,700**; Senator St., Colonial Rd. to Ridge Blvd., PBS-93, **$8,900**; Senator St., 3 to 4 Aves., PBS-94, **$9,000**. State Aid Planning Funds allotted. P. P. Farley, consult. engr. Brooklyn Boro.

N. Y., **Jamestown**—City, Dpt. P. Wks., City Hall, repairs, reconstructing various paved streets. **$200,000**. C. J. Strandburg, city engr.

N. Y., **Mohawk**—District Comrs., Montgomery Co., plans underway reconstructing County Rd. 91, **$40,000**. State Aid Planning Funds allotted.

★N. Y., **New York**—President Bronx Boro, 851 Grand Concourse, Zone 51, plans underway, regulating, etc. W. 232 St., Johnson to Netherland Ave., PXS-174 **$19,500**; regulating, sheet asphalt paving Beech Terrace, Beekman to Crimmins Ave., PXS 174, **$7,200**; regulating, grading, etc., Westervelt Ave., Pelham Parkway North to Waring Ave., PXS-176 **$21,600**; Narragansett Ave., Pelham Parkway South to Lydig Ave., PXS-177, **$5,800**; Barnes Ave., Gunhill Rd. to 233 St., PXS-178, **$100,800**; intersection of E. 219 St., Carpenter Ave. and Bronx Blvd., PXS-180, **$5,800**; Kennellworth Place, Spencer Dr. to Griswald Ave., PXS-182, **$10,200**; streets north of E. 233 St. to Nereid Ave., and west of Baychester Ave., PXS-183, **$150,000**; Spuyten Duyvil Parkway from Hendrick Hudson Parkway to Bway., PXS-86, **$172,000**; streets in Gould Estate, PXS-184, **$150,000**; curb and flag, Fieldstone Rd., W. 253 St. to Mosholu Parkway, PXS-185, **$12,000**; sheet asphalt paving Andrews Ave., W. 183 St. to Fordham Rd., PXS-164, **$33,000**; W. 183 St. Loring Place to University Ave., PXS-165, **$18,800**; Bainbridge Ave., Fordham Rd. to Moshulu Parkway South, PXS-161, **$100,800**; paving bricks, Shakespeare Ave., W. 168 St. to W. 169 St., PXS-167, **$24,600**; regulating, grading, sheet asphalt paving W. 229 St., Bailey to Heath Aves., PXS-179, **$6,500**; Bronx River Ave., Eastern Blvd. to Westchester Ave., PXS-181, **$27,900**; regulating, regrading, granite block paving and construct retaining walls in U. 230 St. between Johnson Ave. and Edgehill Ave.; PXS-186, regulating, grading, paving and constructing steps in Highbridge St. between Nelson St. and Shakespeare Ave.; PXS-187,

The day your steel storage tank is filled, corrosion starts its destructive work on the inside. By means of the *RUSTOP System of cathodic rust control,* under-water corrosion can now be banished *instantly, completely* and *permanently* . . . from old tanks or new. No draining, sandblasting or painting. No service interruptions . . . no taste. Costs pennies per month to operate. Guaranteed. Write for full information. ELECTRO RUST-PROOFING CORP., Dayton 10, Ohio.

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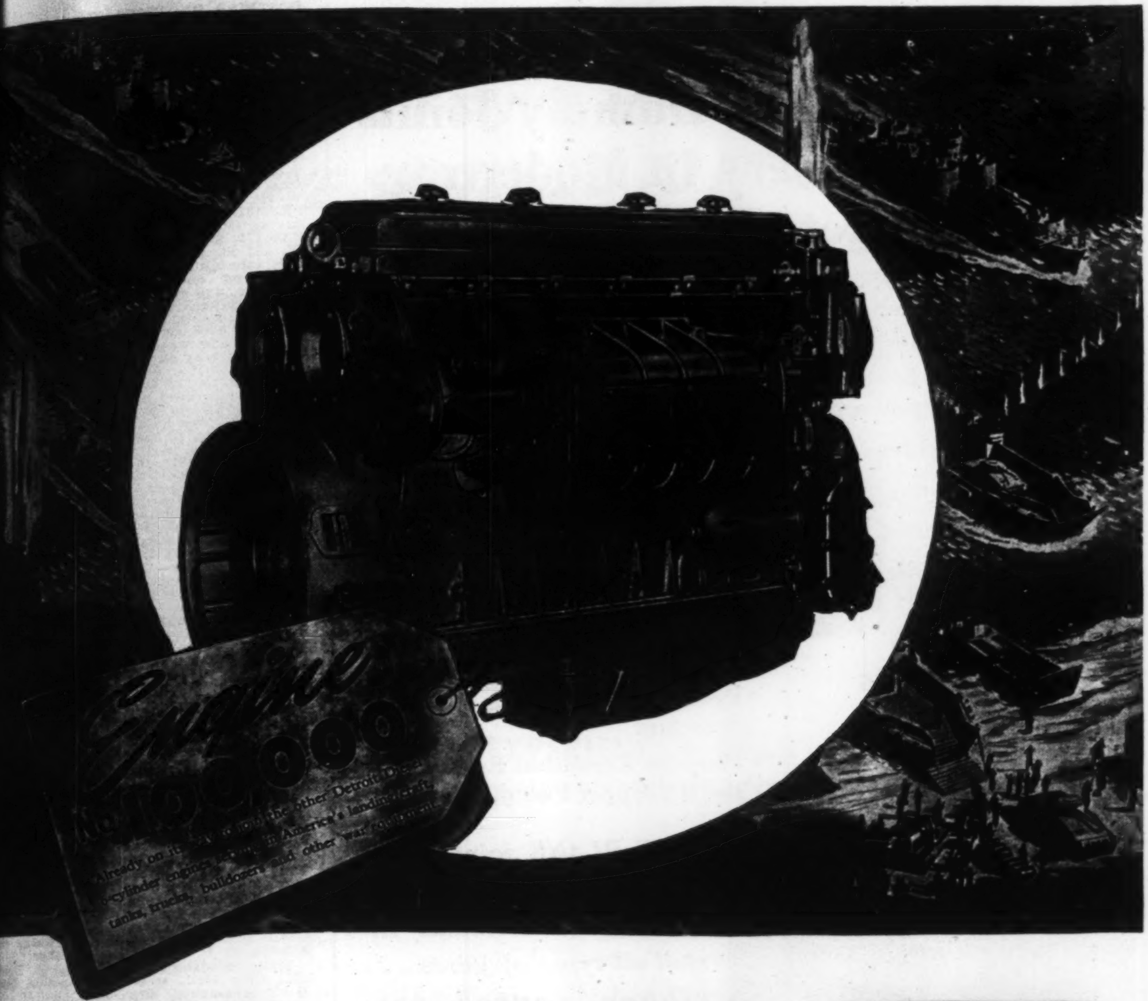
Engine No. 100,000
Already on its way to join the other Detroit Diesel 6-cylinder engines serving in America's landing craft, tanks, trucks, bulldozers and other war equipment.

10 DIVISIONS OF FIGHTING ENGINES

Months ago the Detroit Diesel Engine Division of General Motors sent engine No. 100,000 off the production line to its war job. Many more have followed since. Measured as men, more than ten divisions of these six-cylinder Diesels are actively in the fight. They're in landing craft helping to crack Fortress Europe and to cut the Nips' string of islands They're in tanks, trucks, bulldozers and all kinds of other equipment. The reasons are, these Diesels are tough and dependable. They're easy to maintain. They burn inexpensive fuel oil.

They have been tried and proved in all sorts of war jobs on every battle front. And they've been found good.

With the coming of peace these engines will be available for all the applications where America will need reliable, low-cost power.

KEEP
AMERICA STRONG
BUY
MORE WAR BONDS

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DIESEL
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ENGINES . . 15 to 250 H.P. . . DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.

ENGINES . . 150 to [illegible] . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio

LOCOMOTIVES . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

Twenty-two **REASONS**

Why *FLEX-PLANE* Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
- More Dummy Joints Divide Contraction Openings
- Prevents Cracking
- Retards Creeping
- Controls Warping
- Reduces Curling
- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
- Minimizes Panning
- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place — Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab

FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.

• ***Ask for Equipment Specifications*** •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN OHIO

POSTWAR PROJECTS (Cont'd.)
regulating, grading, constructing steps in W
230 St. from Johnson to Netherland Ave
PXS-188, constructing, erecting woo
guard rail in Bruckner Blvd. from Bai
Ave. to Middletown Rd.; PXS-189, safe
island and adjustment of sidewalks in inte
section of Reservoir and Sedgwick Ave
PXS-190, safety island and readjustment
roadways in area within 3 Ave. and Linc
Ave., E. 137 and E. 138 St.; PXS-191, safe
island and adjustment of roadways in Rive
dale and Irving Aves, from W. 320 to W.
Sts., PXS-192, $75,000; sheet asphalt pavi
Wyatt Ave., Bronx Park to DeVal Av
PXS-157, $11,800; regulating, grading, bri
paving Bush St., Creston to Anthony Ave
PXS-175, $20,000; brick paving Loring Plac
W. 183 St. to Fordham Rd., PXS-166,
800; rehabilitation, incl. clearing, repairin
repainting and waterproofing underpass
viaducts, and bridge at Grand Concourse
170 St., Tremont Ave., Burnside Ave., King
bridge Rd., Bedford Park Blvd., 204
PXS-87, $200,000; cleaning, repairing,
painting and waterproofing steel guard ra
fences, curbing and viaduct on Major Deeg
Blvd., PXS-193, $100,000; repaving Melro
Ave., 149 to 163 Sts., PXS-66, $197,111;
paving, redressed granite block repaving
Ave., E. 135 to E. 138 Sts., PXS-68,
893; sheet asphalt repaving E. 158
Courtlandt to Melrose Aves., PXS-61,
Crescent Ave., Arthur Ave. to E. 187
PXS-149, $30,481; sheet asphalt paving Sed
wick Ave., Jerome Ave. to W. 167 St., PX
156, $182,000. State Aid Planning Fun
allotted. T. B. Dyer, ch. engr. Bronx Boro.

★**O., Ashtabula**—Comrs. Ashtabula C
Jefferson, reconstructing 54 mi. roa
incl. widening, resurfacing. $1,110,000.
O. Topper, Court House, Jefferson, co. eng

O., Sandusky—City, plans 40% com
pleted, paving, resurfacing, widening, cu
and sidewalk repair. $261,000. R. R. Smit
city engr.

★**Pennsylvania**—State Hy. Dpt., Harri
burg, imprv. 9.3 mi. Route 18, Ne
Brighton Borough, Beaver Falls and B
Beaver Twp., $1,094,000; relocation 5.3
Route 88 (Ohio River Blvd.) from sou
County line in Ambridge Borough to Co
way Borough, $3,562,000; imprv. 2.7
Route 88, Conway, Freedom and Ea
Rochester Boroughs, $515,000; 2.45 mi. Oh
River Blvd. exten., Rochester to Ne
Brighton Boroughs, $3,075,000; 14,329 acre
reforestation program, $730,800, all Beav
Co. Financing not yet provided for.
Baker, Jr., Rochester, consult. engr.

★**Tex., Anahuac**—G. C. Jackson, jud
Chambers Co., defeated $3,861,000 bond
road and bridge construction. CD 6/23—EN
7/13.

Tex., Harlingen—Town, permanent pavin
street grading, leveling, etc., 60 blocks
more. $100,000.

Utah, Logan—Logan City Corp., 180
Main St., concrete curb and gutter, co
crete sidewalks, $26,304. Plans 25% com
pleted grading and asphalt surfacing road
$50,689. E. U. Moser, Box 87, engr.

Wis., Reedsburg—City, Wm. H. Dierke
clk., City Hall, street construction, $40,
H. C. Armanson, city engr.

★**Wis., Superior**—City, R. E. McKeaqu
clk., City Hall, paving streets, sidewal
and curb-gutters, $500,000.

EARTHWORK, WATERWAYS

†**Conn., Winsted**—U. S. Eng., 419 Indu
trial Trust Bldg., Providence, R. I., floo
control Mad River preventing overflow a
flooding Lake St. to Case Ave. $125,000.

★**Illinois**—State Dpt. Conservation, Sprin
field, preliminary survey conservation pr
gram in lakes in Adams Co., $137,060; Ale
ander Co., $124,800; Bond Co., $140,
Boone Co., $124,554; Brown Co., $136,
Bureau Co., $141,400; Calhoun Co., $150,
Carroll Co., $65,966; Cass Co., $144,
Champaign Co., $102,170; Christian C

The Rud-o-Matic Combination Magnet Reel and Tagline is a radical departure from the usual reel, something which is brand new and which no one else can offer. It is operated on a string principle for tension. Tagline cable is attached to magnet with sufficient tension to steady, then electric cable is fastened to connections on magnet, leaving same a little slack. As both drums revolve together, electric cable always maintains the degree of slackness originally set. This feature eliminates any possibility of electric cable being pulled apart or jerked loose from the connections, thus insuring a long life for it. Most of the crane manufacturers have adopted Rud-o-Matics as standard equipment.

RUD-o-MATIC
Foolproof
GNET REELS

McCAFFREY-RUDDOCK TAGLINE CORP.
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GOMLEY EQUIP. CO. Philadelphia, Pa.
W. E. PHILLIPS Detroit, Mich.
L. L. HANSON Chicago, Ill.
OWEN BUCKET CO., LTD. Berkeley, Calif.

"OUR TRUCKS DO TWICE AS MUCH WORK *SINCE WE SWITCHED TO TRAILERS*"

—J. A. MERCIER BRICK CO.

THIS EXPERIENCED USER EXPLAINS HOW FRUEHAUF TRAILERS CUT DELIVERY COSTS

"Before we switched to Trailers for delivering brick and concrete blocks, our trucks were often tied up in the yards for loading until 10:00 or 11:00 o'clock in the morning.

"Actually, about half of each truck-and-driver's working hours were eaten up in loading time . . . because the trucks had to stand idle . . . and the best we could get was 2 to 3 round-trips a day with each truck.

"Here are the advantages we have found with the Trailers:

- "Our trucks now do twice as much work as they did before. They average 5 round-trips a day on deliveries up to 25 miles away . . . often make as many as 6 deliveries daily. That's because each truck leaves early in the morning with a Trailer that has been loaded the previous afternoon. While the truck is gone, another Trailer is being loaded. As soon as the truck returns, it "drops" the empty Trailer, couples up to a loaded one and starts off on another delivery.
- "Besides making more trips, the Trailers carry bigger loads. The trucks carried 3,000 bricks or 300 8-inch blocks . . . The Trailers haul 6,000 bricks or 600 blocks . . . yet these double loads are pulled by the same trucks as before. All we did was take the platform off the trucks and shorten the wheelbase.
- "Here's another point. Most of our deliveries are off the road, and we find that the shorter wheelbase truck pulling a Trailer gets through muddy stretches where trucks alone wouldn't budge.

"Everybody is pleased with the Trailers—our customers get better service—our drivers make more money since they are paid for the trips they make—and we're saving money by making more deliveries with only half as many trucks. As a matter of fact, the Trailers have worked out so well for us that we are planning to convert the remaining trucks in our fleet into truck-tractors, and switch our entire operation to Trailers, as soon as the war is over."

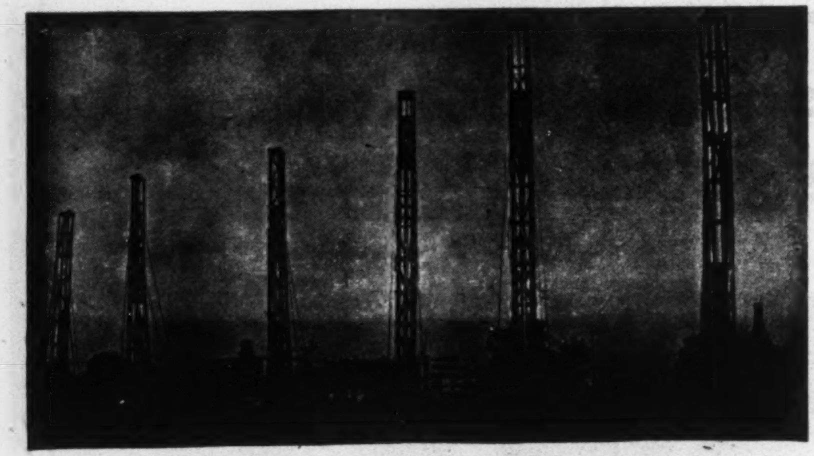
Whether you operate one or two trucks or a large fleet, it's likely that Trailers will fit into your operation, too, and save money for you. Why not call in a Fruehauf transportation engineer today and let him go over your delivery set-up with you? There is no cost or obligation for this service and it may mean a big saving.

World's Largest Builders of Truck-Trailers
FRUEHAUF TRAILER COMPANY
DETROIT
Service in Principal Cities

A TRUCK IS LIKE A HORSE
IT CAN *PULL* MORE THAN IT CAN CARRY

FRUEHAUF TRAILERS

"ENGINEERED TRANSPORTATION"



WESTERN

WESTERN FOUNDATION CO.
WESTERN CONCRETE PILE CORP.
DRILLED-IN CAISSON CORP.

308 W. WASHINGTON ST.
CHICAGO, ILL.

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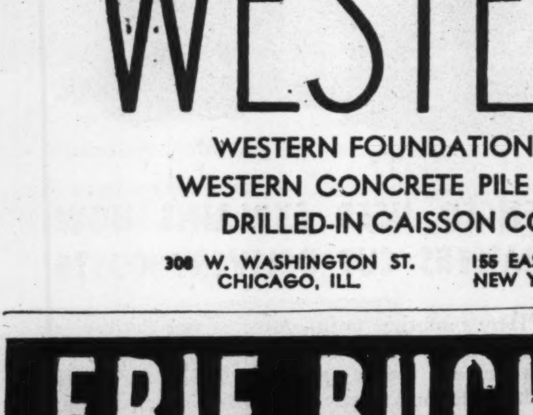
NEW YORK, N. Y.

ERIE BUCKETS



• Erie builds all types of buckets in various capacities and weights to meet the job and operating conditions. Choose the correct bucket for the job and you get maximum speed and output. Write for broadside on the complete Erie line of buckets.

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
AggreMeters • Buckets • Concrete Plants • Traveling Cranes

POSTWAR PROJECTS (Cont'd.)

$169,870; Clark Co., **$164,040**; Clay Co.,
990; Clinton Co., **$130,090**; Coles Co.,
860; Cook Co., **$186,750**; Crawford
$154,680; Cumberland Co., **$165,620**; De
Co., **$151,220**; DeWitt Co., **$100,430**; De
Co., **$138,360**; DuPage Co., **$151,500**;
Co., **$154,580**; Edwards Co., **$141,840**;
ham Co., **$155,300**; Fayette Co. **$80,000**;
Co., **$123,720**; Franklin Co., **$108,500**;
Co., **$114,850**; Gallatin Co., **$106,160**; G
Co., **$132,500**; Grundy Co., **$138,620**; Ham
Co., **$147,300**; Hancock Co., **$158,170**; H
Co., **$141,810**; Henderson Co., **$135,670**;
dry Co., **$134,140**; Iroquois Co.,
Jackson Co., **$139,380**; Jasper Co.,
Jefferson Co., **$127,870**; Jersey Co.
Jo Daviess Co., **$135,670**; Johnson Co.,
670; Kane Co., **$160,720**; Kankakee
$150,614; Kendall Co., **$162,920**; Knox
$154,900; Lake Co., **$137,480**; La Salle
$145,010; Lawrence Co., **$147,200**; Lee
$130,520; Livington Co., **$128,340**; Logan
$135,960; McDonough Co., **$127,630**; McH
Co., **$142,280**; McLean Co., **$153,980**;
Co., **$132,430**; Mecoupin Co., **$111,050**;
son Co., **$142,800**; Marion Co., **$152,360**;
shall Co., **$148,030**; Mason Co.,
Massac Co., **$132,770**; Menard Co.,
Mercer Co., **$145,162**; Monroe Co.,
Montgomery Co., **$151,640**; Morgan Co.,
410; Moultrie Co., **$148,120**; Ogle
$133,750; Peoria Co., **$189,070**; Perry
$167,940; Platt Co., **$167,390**; Pike
$149,760; Pope Co., **$164,362**; Pulaski
$212,300; Putman Co., **$147,470**; Ran
Co., **$140,050**; Richland Co., **$131,600**;
Island Co., **$143,410**; St. Clair Co.,
Saline Co., **$112,170**; Sangamon Co.,
Schuyler Co., **$143,780**; Scott Co.,
Shelby Co., **$129,770**; Stark Co.,
Stephenson Co., **$121,440**; Tazewell
$128,370; Union Co., **$150,160**; Vermilion
$148,080; Wabash Co., **$140,540**; Warren
$143,780; Washington Co., **$135,840**; W
Co., **$140,930**; White Co., **$142,660**; Whit
Co., **$142,390**; Will Co., **$111,360**; Willia
Co., **$140,970**; Winnebago Co., **$92,960**;
ford Co., **$146,280**. Not approved by Ill
Planning Comn.

Ill., East St. Louis—East Side Leve
Sanitary Dist., B. O. Cooper, pres.,
Missouri Ave., diversion channel for
moval storm water from outer State
area and removing flood menace in Wash
ton and Lake Park areas. **$370,000.**

★ **†North Carolina and Virginia**—U. S.
21 St. and Virginia Ave. N.W., W
25, D. C., development Yadkin-Pee Dee
Basin, reservoir at Wilkesboro, Wilkes
N. C., total cost, **$105,840,000**; 11 flood
trol projects on Roanoke River in ea
part of North Carolina, incl. reservoir
Bugg Island and Philpott, Va., total
$124,000,000.

O., Sandusky—City, jetty paving and
pairs. **$31,000.** Land rights not cle
and financing not yet provided for.
Smith, city engr.

Utah, Logan—Logan City Corp., 18
Main St., Logan, line irrigation canals
concrete to stop infiltration of water
sewer lines. **$91,050.** E. U. Moser, Bo
engr.

PUBLIC BUILDINGS

★ **Calif., San Bernardino**—City School
San Bernardino, plans by Marsh, S
& Powell, 816 W. 5 St., Los Angeles, sch
W. L. Culver, Anderson Bldg., assoc. a
$500,000. CD 8/2.

Conn., Ansonia—City, Bd. Educ.,
Hall, plans by Brown & Von Beren, Inc.,
Sherman Ave., New Haven, brick, steel
school, Prospect St. **$300,000.**

Conn., Newtown—Bd. Selectmen,
Hall, plans by Brown & Von Beren,
295 Sherman Ave., New Haven, 2
bsmnt., brick, steel school. **$150,000.**

Conn., Westport—Town, W. A. Kr
clk., Town Hall, brick, stone municipal
over **$150,000.**

Ill., Bloomington—State Militia, 23
Chicago Ave., Chicago, sketch plans u
way by C. Herrick Hammond, state a
Armory Bldg., Springfield, new armor
Main St., across from Highland Park
Course, 4 land acres available. **$350,**

Ind., Crawfordsville—City, extens.,
to equip. municipal power plant, **$150,**
more. L. B. Clurg, city engr.

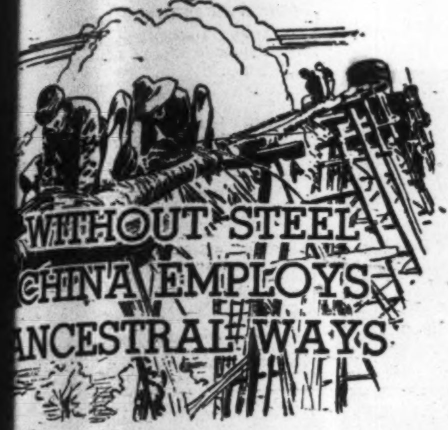
Ind., Decatur—Bd. P. Wks., J. B. S
mayor, chn., V. Aurand, secy., City
municipal power plant imprvs., new 7,5
10,000 k.w. generators, new boilers, sw
board, **$250,000.** Financing not yet prov
for. R. E. Roop, City Hall, city engr.

Mass., Boston—Commonwealth of Ma
chusetts, Supt. Bldg., State House, Bo
plans by C. R. Greco, 11 Beacon St., im
State House, FG 2. **$350,000.**

Mass., Quincy—City, brick, steel bldg.
health clinics, etc. **$150,000.**

Mass., New Bedford—City Supt. P. B
City Hall, brick, steel vocational
addns. **$150,000.**

Mass., Westboro—Commonwealth of
sachusetts, Dpt. Mental Health, 100 Na
St., Boston, alterations, imprvs. power h
PM 36, State Hospital, **$300,000.**
Warrington, 211 Congress St., Boston,
sult. engr.

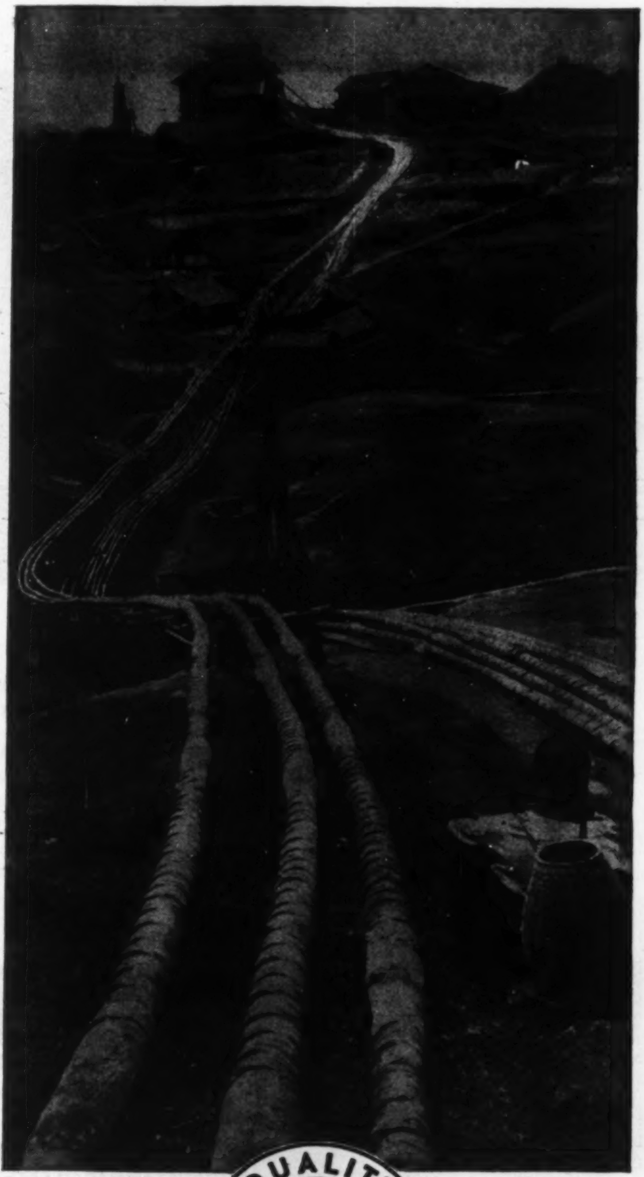


THIS picture might have been
centuries ago. It shows a bamboo
ine, carrying brine from 2,600 year
lt mines to a refinery in the heart of
rn China. Here in Tse Liu Ching,
wan province, steel pipe is not avail-
and the Generalissimo's engineers
use primitive bamboo pipe as a war-
ubstitute.

course the bamboo pipe splits, is
by insects, deteriorates with age and
Every day coolies must repair it, by
ping the lines with bamboo strips.
are countless sizes of bamboo pipe,
fferent (and none of them big enough).
the technique of making permanent
-tight joints is unknown.

this bamboo pipe points to what we
erica seldom realize..the importance
el. Low-cost durable steel pipe, for
ple, is a priceless ingredient of our
zation. Without it we could not have
ure water supplies, or our sanitary
ms. Our railroads, factories, oil fields
ower plants could not exist without
n steel pipe.

l is America's No. 1 basic industry.
hole structure of American life--with
security, convenience and comfort--
ds upon the steel and steel products
hich Youngstown is a leading
acturer.



QUALITY
TRADE MARK
YOUNGSTOWN
SERVICE

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of
CARBON · ALLOY AND YOLOY STEELS

Ask your distributor for Youngstown
Pipe and Tubular Products - Sheets - Plates - Conduit -
Bars - Electrolytic Tin Plate - Coke Tin Plate - Rods - Wire -
Nails - Tie Plates and Spikes - Alloy and Yoloy Steels

• A Griffin Wellpoint Job •

Predraining DENSE Soil
is EASY for GRIFFIN

Water level was lowered from the surface a total of 17 feet by Griffin in this job. Note the way the banks were cut to stand on a steep slope—that means dense stuff, hard to get the water out—if you don't use Griffin Equipment. And so dry was the job that they needed no additional Wellpoints to dewater an excavation 75 feet from the above. Results count — why say more?

FOR SALE OR FOR RENT

MID-WEST
GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
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SOUTH
GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
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MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.
GRIFFIN WELLPOINT CORPORATION

POSTWAR PROJECTS (Cont'd.)

★ **Mich., Detroit**—Wayne Co., in conj
tion with City of Detroit, $7,000,000
erection Nov. 7, combined county and
office bldg., G. R. Thompson, City Hall,
troit, city engr., and L. C. Smith, 3800 Bar
Tower, co. road engr.

Mich., Detroit—Wayne Co. Training Sch
plans completed alterations, addns. for re
vating Training School Plant. $467
L. C. Smith, 3800 Barium Tower, co. r
engr.

Mich., Detroit—Dpt. Health, 3919 John
Detroit, plans completed heating and
water extens., in Annex, Children B
$47,600. Geo. R. Thompson, city engr.

Mich., Detroit—Dpt. Parks & Recreat
735 Randolph St., plans completed
40x55 ft. brick, concrete refectory b
$100,000; brick, steel, rein.-con. Lasky
reational Center gymnasium and auditor
$150,000. Geo. R. Thompson, city engr.

Mich., Detroit—Dpt. P. Welfare, 17
Jefferson Ave., plans completed Eas
Market, addn. to service bldg., $51
Western Market, addn. to service bldg.,
000; Chene-Ferry Market comfort sta
$15,300; Eastern and Western market sh
$125,000. G. R. Thompson, City Hall,
engr. CD 3/30—ENR 4/1.

Mich., Detroit—Detroit Zoological
Comn., 8450 Ten Mile Rd., Royal Oak, p
completed brick, steel, stone, concrete
missary bldg., on Belle Isle, **$80,000.**
R. Thompson, City Hall, city engr.

Mich., Royal Oak—City, E. Shafter,
mgr., City Hall, plans completed by C.
Ditchy, 705 Lincoln Bldg., Detroit, 1 st
rein.con., brick, steel bldg., for garage,
pair shop, meter storage and shops for
ious activities of Dpt. P. Wks. **$100,000.**
2/17—ENR 3/9.

Minn., Red Wing—City, Bd. Educ., L
Harbo, supt., high school addn., incl.
nasium, auditorium. Over **$200,000**
official).

★ **Mo., Allenton**—Academy of Science o
Louis, W. D. Shipton, secy., Washin
University, Skinker and Lindell B
Zone 5, St. Louis, preliminary sket
made by J. D. Murphy, and K. Scha
c/o Washington University, Skinker
Lindell Blvds., Zone 5, St. Louis, rein.-
brick, structural steel, etc. vivarium (
life conservation center or museum) on
overlooking Rockwoods Reservation,
here. **$750,000.**

Mo., Maplewood (br. St. Louis, 17)—
J. Usher, city clk., 7483 Manchester
new city hall, **$175,000.**

★ **Mo., St. Louis**—City, c/o M. M. Ki
pres., Bd. P. Service, 304 City Hal
and Market Sts., Zone 3, voted $25
bonds remodeling, Art Museum, in F
Park; **$950,000** bonds construct., reconst
hospitals and institutions. **$2,400,000** a
able from previous bond issues; $80
voted for 11 new fire engine stations
remodeling 5 existing bldgs. CD 6
ENR 7/13.

Mo., University City (br. St. Louis,
City, W. A. Heimbuecher, city engr.,
Hall, University City, St. Louis, Zon
6801 Delmar Blvd., war memorial comm
bldg. **$200,000.**

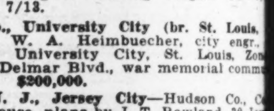
★ **N. J., Jersey City**—Hudson Co., C
house, plans by J. T. Rowland, 30 Jo
Sq., service and power plant bldg., at
cal Center. **$1,000,000.**

N. Y., Batavia—Bd. Educ., H. E.
rower, in charge, brick, steel, concrete
school, State Park Dist. Over **$400,000.**

N. Y., Bedford Hills—Dpt. P. Wks.,
Office Bldg., Albany, plans underway
Thompson, Holmes & Converse, Inc., 1
39 St., New York, Zone 16, COR-2, indu
bldg. at Westfield State Farm for
Correction, State Office Bldg., Albany,
000. CD 6/21—ENR 7/13.

Write for One of These Books

Eichleay service includes steel erection, moving structures, foundations for heavy machines, installing machinery, relocating industrial units, and related projects. Frequently while foundations are being constructed machinery is erected and then moved to location, thus saving much "down time."



EICHLEAY [illegible] 19th Street, Pittsburgh 3, Pa.

INDIAN

TRAIL TO TOKYO

Rugged OSGOODS and Native Labor Help Army Engineers Blaze Vital Chinese Supply Line Through Burma.

S. Army supply lines are inching their way ross the dense jungles of northern Burma ong a route known as the Ledo Road. The timate terminus for which our engineers are ghting and sweating, digging and building is . . Tokyo.

elping to clear the way and move the dirt ong this virgin trail are husky, mobile SGOOD Shovels. It's a tough job; as tough test as you'll find for ingenious men and achines. That OSGOOD'S measure up — here well as in battle areas all over the map — a good thing to remember.

or someday your money, now invested in War onds will be buying new equipment, and when at day comes OSGOOD power, maneuverility and durability will be ready to deliver e proven performance you want!

U. S. Army Signal Corps and OWI Photos.

Ledo Road to China—through tangled jungle, over innumerable rivers, streams and chasms, and blasted out of tree-covered hillsides—will in due time carry Allied supplies for the storming of Tokyo.

THE
GENERAL
EXCAVATOR COMPANY
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

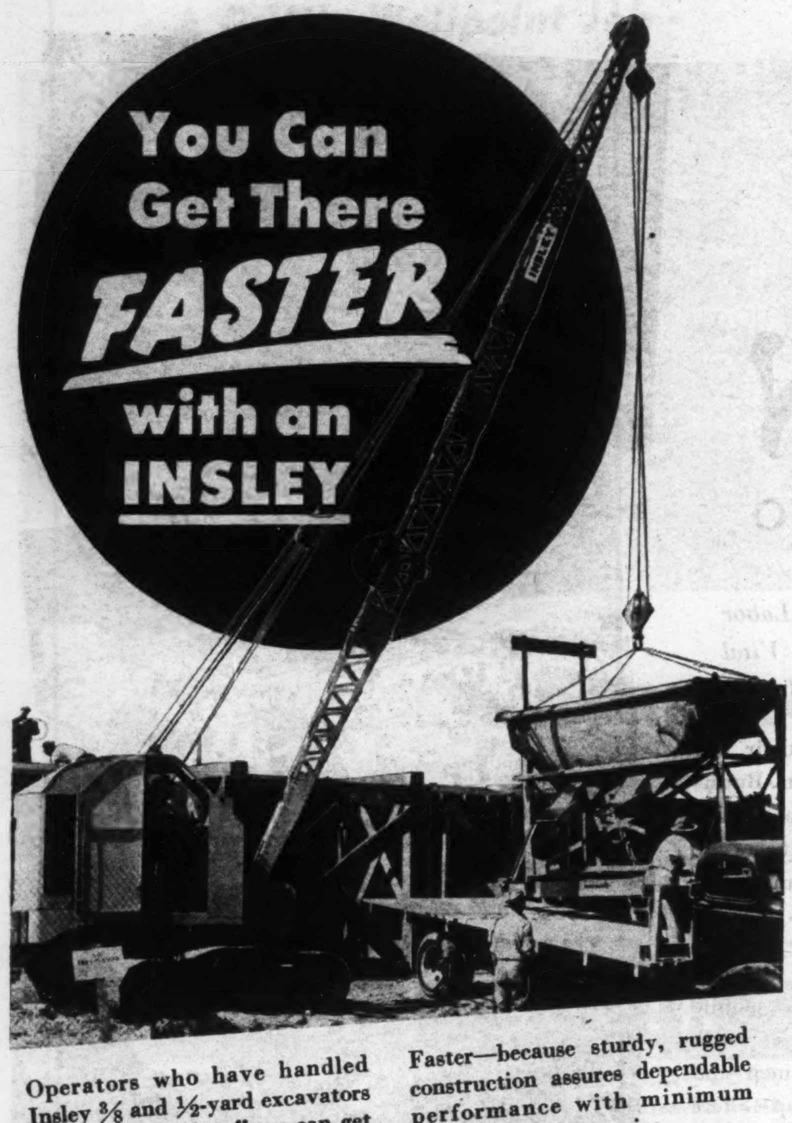
Associated with **The General Excavator Company**

OSGOOD

CRANES-SHOVELS MARION OHIO OSGOOD GENERAL

THE OSGOOD COMPANY • MARION, OHIO

OSGOOD
SHOVELS, DRAGLINES CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC


You Can
Get There
FASTER
with an
INSLEY
EXCAVATORS · CRANES · BUCKETS · CARTS
INSLEY
CONCRETE PLACING EQUIPMENT

Operators who have handled Insley 3/8 and 1/2-yard excavators have a saying that "you can get there faster with an Insley."

Faster—because Insley's rapid work cycle produces more yardage per hour, per day. Faster—because clean, compact design permits Insley Excavators to work the tight spots. Faster—because Insleys can be moved easily and quickly from job to job.

Faster—because sturdy, rugged construction assures dependable performance with minimum "down-time" for service.

Right now, all of the Insley Excavators we can build are going to our fighting forces all over the world. But after the war, there'll be plenty of new Insleys to handle your toughest dirt moving and material handling jobs—*faster and cheaper.*

INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS 1, INDIANA

POSTWAR PROJECTS (Cont'd.)

N. Y., Brentwood—Dpt. P. Wks. Sta
Office Bldg., Albany, Zone 1, plans com
pleted, garage at Edgewood State Hospita
Proj. MH-64, for Dpt. Mental Hygiene, Sta
Office Bldg., Albany, Zone 1. **$50,000.** Di
Construction, Div. Architecture, C. J. Whit
comr. Architecture, State Office Bldg., A
bany, Zone 1, engr.

★**N. Y., Jamestown**—City Bd. P. Utilitie
Thos. McKee, secy., City Hall, moderniz
tion, exten., imprv. municipal power plan
distributing lines, etc. **$1,500,000.** C.
Johnson, City Hall, supt. and engr.

O., Sandusky—City, city bldg. **$300,0**
Land rights not cleared and financing n
yet provided for. R. R. Smith, city engr.

R. I., Cranston—City Council, City Ha
brick steel school incl. athletic and recre
tion field, Nechanticut Park, over $150,0
CD 10/28—ENR 11/4.

Tex., Fort Worth—E. P. Williams, bu
mgr., Public Schools, plans underway b
A. B. Withers, Insurance Bldg., concre
Junior High School bldg., incl. site imprv
$230,000.

Utah, Logan—Logan City Corp., 180
Main St., plans 50% completed installin
new unit in Diesel Power Plant. **$198,0**
E. U. Moser, Box 87, engr.

★**N. B., St. John**—Dominion Governme
Ottawa, Ont., customs and immigrati
bldgs. **$1,500,000.** Dpt. P. Wks., Ottaw
Ont., archt.

N. B., St. John—Municipality, residenti
development. Stanley Ward. **$300,000.**

Ont., Ottawa—Dominion Govt., Ottaw
bldg. for Privy Council Chambers and offi
of Prime Minister, Bank St. near Wellingto
St. **$350,000.**

COMMERCIAL BUILDINGS

★**Calif., Sacramento**—Sutter Hospital
Sacramento, 2820 L St., preliminary pla
by C. F. Dean, California State Life Bldg
2 story, rein.-con. hospital bldg., containi
400 beds, at 42 and F Sts. **$1,500,000.**

Conn., Bridgeport—Bridgeport Brass Co
30 Grand St., plans by Fletcher Thompso
Inc., 211 State St., 4 story, brick, steel o
fice bldg., housing employment offices, et
$150,000.

Conn., Fairfield — Fairfield Preparato
School, Fairfield, plans by O. Reagan, Saxo
Lane, Westport, 3 addnl. brick bldg
$150,000.

★**Conn., Hartford**—Hartford Hospital,
South Hudson St., plans by Coolidg
Shepley, Bulfinch & Abbott, 1 Court S
Boston, Mass., 16 story, brick, steel hospit
bldg. Office of Hollis French, 210 South S
Boston, Mass., consult. engrs. **$4,500,0**
CD 7/21/43.

Conn., Norwalk—J. Yafjack, 239 East Av
East Norwalk, 2 story, bsmnt., 95x115 f
brick, steel theater-business bldg., Grego
Blvd. and East Ave. Owner will constru
$150,000. J. Dahler, Wolfpit Rd., archt. C
3/23—ENR 4/6.

Ill., Bloomington—State Farm Insuran
Co., Bloomington, plans completed
Schaeffer & Hooton, Peoples Bank Bldg.,
story top addn. to back of present bld
$250,000.

Mass., Marlboro—Marlboro Hospital, In
Union St., plans by Curtin & Riley, 45 Ne
bury St., Boston, brick, steel hospital, Uni
St. **$150,000.**

Mo., St. Louis—St. Louis, Archidiocese
the Catholic Church, c/o Archbishop J.
Glennon, 4901 Lindell Blvd., Zone 8, rein
con., brick, stone high school bldg., on
Newstead Ave. between Anderson and Bes
Ave. Site purchased. CD 11/15—ENR 12/

★**Mo., University City (br. St. Louis)**
Bond Realty Co., c/o Ansell Bros. Ci
cuit, Empress Theatre, 3616 Olive St., S
Louis, Zone 8, 2,000-seating capacity moti
picture theatre, apartment bldg. and par
ing garage on site fronting 350 ft. on sou
side of Delmar Blvd., in 6600 Block, ro
will be designed to provide 164x350 ft. lan
ing area of auto-giro planes, **$800,000**
more with equip. Site purchased.

★**N. Y., Forest Hills**—65 Yellowstone, In
c/o H. I. Feldman, archt., 415 Lexingt
Ave., New York, Zone 17, plans completed
story, 90x224 ft., apartment house, 65 A
and Yellowstone Blvd., **$250,000**; apartm
house 102 St., **$250,000.**

★**N. Y., New York**—Andros Realty Cor
8-10 Bridge St., Zone 4, plans complet
by Boak & Raad, 10 E. 43 St., Zone
apartment house, 6 Ave. from 56 to 57 S
$1,200,000.

★**N. Y., New York**—Cortlandt & Dey S
Corp., c/o City Bank Farmers Trust C
22 William St., Zone 5, plans completed
Eggers & Higgins, 542 5 Ave., Zone 19,
story office bldg., 14-22 Cortlandt St., ru
ning through to 9-17 Dey St. **$5,000,000.**

★**N. Y., New York**—Estate of R. W. Goel
18 E. 47 St., Zone 17, plans completed
Walker & Gillette, 599 Madison Ave., Zo
22, 10 story department store bldg., 378-
Park Ave. **$2,722,700.**

★**N. Y., New York**—44 Beaver St. Cor
c/o City Bank Farmers Trust Co.,
William St., Zone 5, plans completed
Eggers & Higgins, 542 5 Ave., Zone 19,
story office bldg. with penthouse, 38-
Beaver St., running through to 8-25
William St. **$3,531,000.**

STREAMLINE COPPER SERVICE PIPE
STREAMLINE SOLDER TYPE FITTINGS
AN UNBEATABLE PAIR...
...for water service connections
vibration-proof..leak-proof..rust-proof

ny municipalities throughout the country are
y making post-war plans for improvements or
litions in their water systems. STREAMLINE cop-
pipe connected with STREAMLINE solder type fit-
s provides the most practical installation for water
ice lines . . . for all general plumbing and heating
poses, and for many applications in filtration plants.

d together, STREAMLINE copper pipe and STREAMLINE
der fittings are an unbeatable pair.

EAMLINE copper pipe when assembled in the STREAMLINE
g rests upon an internal shoulder of practically the same
ht as the thickness of the pipe wall, thus forming a continu-
y smooth waterway which offers no anchorage points for the
ding up of foreign matter in the water.

VIBRATION PROOF

EAMLINE copper pipe connected with STREAMLINE solder fittings is
from the harmful effects of vibration. Vibration is not localized at the
s as it is with threaded or flared fittings, but is harmlessly dissipated
ghout the service line.

SETTLEMENT AND FROST ACTION

AMLINE copper service pipe is so ductile that it will stretch enough to easily
care of any settlement of filled earth, or, in fact, anything that might impose a strain on the service line which would cause failure of rigid ferrous pipe or, at the very least, cause leakage at the threaded connections.

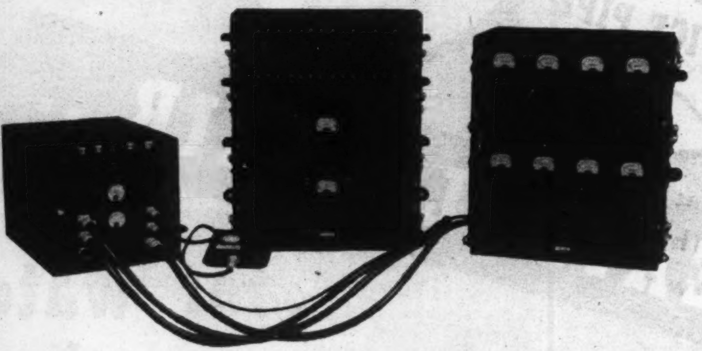
In the Northern States and in the Dominion of Canada, copper service pipe of our manufacture has an outstanding advantage that places it far in advance of any other service material. This advantage is its resistance to frost action. This service pipe containing water under almost any range of pressure used in water service work can be alternately frozen and thawed out for a considerable number of times without showing any effect except a slight increase in diameter.

INVESTMENT INSURANCE

STREAMLINE copper pipe and fittings are at present being used 100% for war purposes in naval craft of practically all kinds, but it is not too early to plan again for their peacetime use. Waterworks officials who are responsible for the return on a heavy capital investment will find STREAMLINE materials one of the lowest cost forms of insurance that they can adopt.

STREAMLINE
PIPE AND FITTINGS DIVISION
MUELLER BRASS CO.
PORT HURON, MICHIGAN

ELECTRONIC SLEUTHS TO TRACK DOWN DAMAGING VIBRATION AND STRAIN



The searching out of vibration and strain has become one of the most vital phases of aircraft design and development. Accurate knowledge of the dynamic and static forces encountered in aircraft engines and structures has contributed greatly to the Allied Nations' production of superior warplanes. Flying ever faster and farther, many of these planes are literally shot to pieces and yet bring their crews safely back.

Consolidated Vibration and Strain Measuring Instruments have rendered vital service in the creation of nearly every type aircraft now in use by the United States Air Forces. Light weight, compact and rugged, these instruments are the most sensitive and accurate of their type in existence. Accelerometers, Amplifiers, Power Supplies and Recording Oscillographs, as manufactured by Consolidated Engineering Corporation, are the result of many years' work in this field.

LOOKING TO THE FUTURE: *At present available only to aircraft manufacturers and government air laboratories, these instruments will be applied in the near future to all of the transportation, structural and mechanical engineering fields. Write us concerning your vibration and strain measuring problems.*

595 EAST COLORADO STREET • PASADENA, CALIFORNIA

SPECIALIZING IN VIBRATION AND STRAIN MEASUREMENT

CONSOLIDATED ENGINEERING CORPORATION

Herbert Hoover, Jr. President

POSTWAR PROJECTS (Cont'd.)

★**N. Y., New York**—1407 Bway. Corp.
L. W. Abrons, pres., 285 Madison Ave.,
Zone 17, plans completed by E. Jacques
Kahn & R. Allen Jacobs, 2 Park Ave., Zone
16, 37 story office and showroom bldg.
Bway. from 38 to 39 Sts. **$5,000,000.**

★**N. Y., New York**—650 Madison Ave
Corp., c/o City Bank Farmers Trust Co.,
22 William St., Zone 5, plans completed b
Eggers & Higgins, 542 Fifth Ave., Zone 1
35 story office bldg., 640-50 Madison Ave.
between 59 and 60 Sts. **$3,000,000.**

★**N. Y., New York**—Sixth Ave. & 44 S
Corp., c/o City Bank Farmers Trust Co
22 William St., Zone 5, plans completed b
Eggers & Higgins, 542 5 Ave., Zone 19, 4
story store, loft and office bldg., 6 Ave. be
tween 43 and 44 Sts. **$9,375,000.**

★**N. Y., New York**—Village Constr. Corp
J. Perlbinder, pres., 19 W. 44 St., Zon
18, plans completed by H. I. Feldman, 41
Lexington Ave., Zone 17, two 12 story, pent
house apartment bldgs., 27-39 E. 35 St., an
28-36 E. 36 St. **$700,000** each.

★**N. Y., New York**—300 E. 57 St., Inc.,
W. 44 St., Zone 18, plans completed b
Emery Roth & Sons, 18 E. 48 St., Zone 1
apartment house, 2 Ave. and 57 St. **$700,0**

★**O., Cincinnati**—Jewish Hospital, Burne
Ave., plans underway by Schmidt
Erickson, 104 S. Michigan Blvd., Chicag
Ill., brick, stone, rein.-con., steel hospit
addn., remodeling. **$800,000.**

O., Cleveland—Park School of the Cleve
land Jewish Center, c/o L. Ratner, 17903 S
Clair Ave., brick, steel, concrete templ
$250,000. Site not selected and financing n
yet provided for.

★**Pa., Phila.**—W. T. Grant Co., 1010 Mark
St., plans underway store and office,
and Market Sts. **$3,500,000.** Site purchase

★**Tenn., Memphis**—J. B. Goodwin, Com
merce Title Bldg., Memphis, sub-divisio
of 114 homes, McLean, Vollintine, Evergre
and Brown Sts., **$8,000** to **$12,000** each;
homes, Union and Poplar Sts., **$6,000—$8,**
each. Property purchased.

Tenn., Nashville—McKendree Methodi
Church Congregation, 523 Church St., c
Dr. K. Vivion, pastor, 3950 Wordin Av
church auditorium and classrooms. **$250,0**

★**Tex., Dallas**—Owner, c/o Hudson & Hu
son, Praetorian Bldg., plans 5% com
pleted by Grayson Gill, Great National L
Bldg., 26 story, 650 room hotel bldg. **$6,25**
000.

Tex., Houston—E. Middleton, Galena Par
Houston, purchased site community cente
2000 Blk. Clinton Dr. **$150,000.**

Wis., Racine—Lincoln Hospital, 2015 Pro
pect St., brick, rein.-con. hospital add
remodeling, new power plant and elevato
$150,000.

★**Que., Montreal**—Zellers Ltd., 1253 M
Gill College Ave., plans 2 stores, one
St. Catharine St. W. between McGill Colle
Ave. and Victoria St.; and other on St. Cat
arine St. E, near Amherst St. **$1,400,000.**

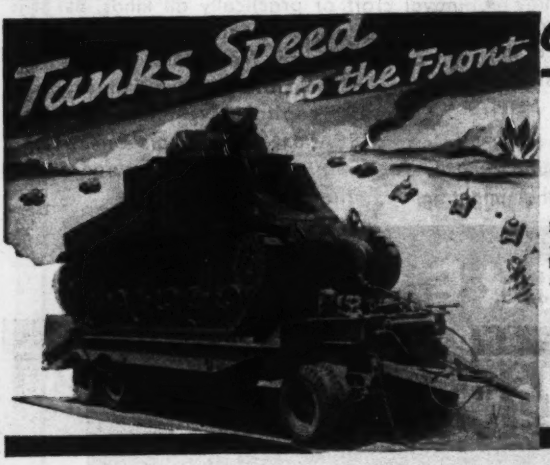
INDUSTRIAL BUILDINGS

★**Calif., San Jose**—PLANT—General El
tric Co., 235 Montgomery St., San Fra
cisco, purchased 56 acres land at Monte
Rd. and Stone Ave. for electric transform
mfg. plant, **$1,000,000.**
plant, **$1,000,000.**

Conn., Cheshire—FACTORY—Safety F
Inc., Willow St., West Cheshire, plans
Brown & Von Beren, Inc., 295 Sherm
Ave., New Haven, 1 story, 80x125 ft., bri
steel factory. **$45,000.**

Conn., East Hartford — WAREHOUSE
First National Stores, Inc., Oakland A
food warehouse expan., incl. distribut
center addns. Over **$40,000.**

Conn., Middletown — FACTORY — Ru
Mfg. Co., 88 E. Elm St., plans completed
L. F. Caproni, engr. and archt., 1221 Cha
St., New Haven, 1 story, 100x125 ft., bri
steel factory. **$50,000.**


Tanks Speed to the Front

on ROGERS TRAILERS

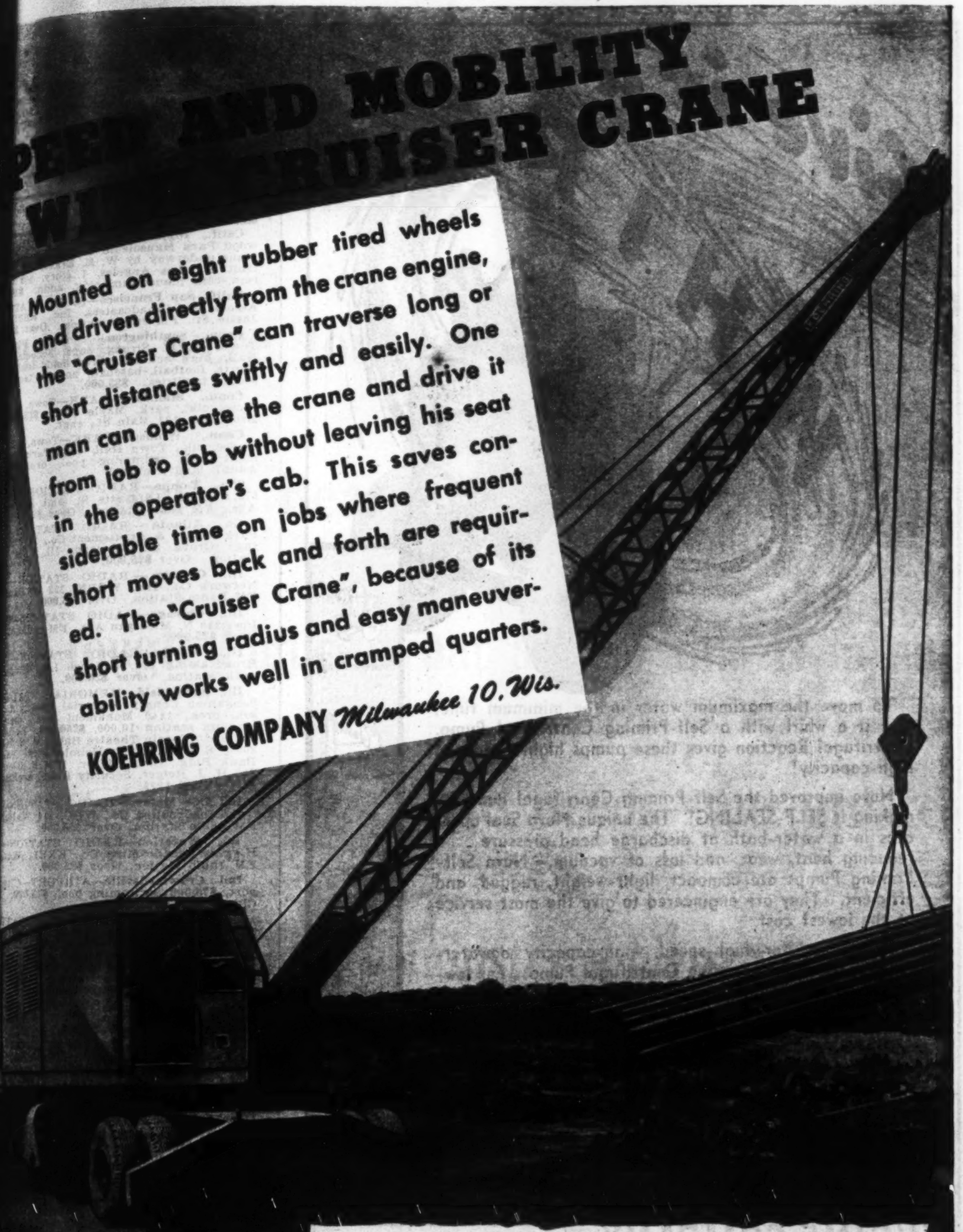
GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

ROGERS TRAILERS are doing a real war job at home and abroad. New models which will be available to industry when war contracts are completed will be even better-engineered and more efficient than their predecessors.

EXPERIENCE *builds 'em*
PERFORMANCE *sells 'em*

ROGERS BROS. CORPORATION
ALBION,
PENNA.



Mounted on eight rubber tired wheels and driven directly from the crane engine, the "Cruiser Crane" can traverse long or short distances swiftly and easily. One man can operate the crane and drive it from job to job without leaving his seat in the operator's cab. This saves considerable time on jobs where frequent short moves back and forth are required. The "Cruiser Crane", because of its short turning radius and easy maneuverability works well in cramped quarters.

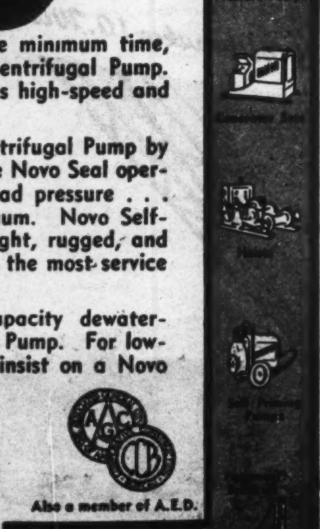
KOEHRING COMPANY *Milwaukee 10, Wis.*

If you have idle construction equipment, make it available for home front use, where it is urgently needed. Register all your idle equipment with the local office of the War Production Board.

ARMY E NAVY

KOEHRING K HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Give it a WHIRL


To move the maximum water in the minimum time, give it a whirl with a Self-Priming Centrifugal Pump. Centrifugal Reaction gives these pumps high-speed and high-capacity!

Novo improved the Self-Priming Centrifugal Pump by making it SELF-SEALING! The unique Novo Seal operates in a water-bath at discharge head pressure . . . reducing heat, wear, and loss of vacuum. Novo Self-Priming Pumps are compact, light-weight, rugged, and efficient. They are engineered to give the most service at the lowest cost.

Remember, for high-speed, high-capacity dewatering . . . use a Self-Priming Centrifugal Pump. For low-operating, low-maintenance cost . . . insist on a Novo Self-Sealing Self-Primer. Give it a whirl, you won't regret it.

Let us send you complete information about the complete line of Novo Self-Priming Centrifugal Pumps (1½" to 6")

Also a member of A.E.D.

NOVO
ENGINE COMPANY LANSING, MICHIGAN

NOVO ENGINE COMPANY, 200 Porter Street, Lansing 5, Michigan

Please send me Bulletin No. 175A with full particulars about Novo Self-Sealed, Self-Priming, Centrifugal Pumps.

Name______________________________

Address______________________________

City__________________State______________

POSTWAR PROJECTS (Cont'd.)

Tex., Houston—PLANT—Carnation
303 D'Amico St., purchased site, large p
expan. program. $150,000.

Tex., San Antonio—WAREHOUSE—W.
Fitzpatrick & W. E. Borgers, 324 McCullo
St., purchased site, household furnish
warehouse, Laurel and N. San Marcos
Over $40,000.

Tex., San Antonio—FACTORY, etc.
Ross Boles & Co., 232 E. Pacan St., p
15% completed 1 story, key mfg. fac
and repair shop. Over $10,000.

UNCLASSIFIED

Calif., Inglewood — MAUSOLEUM—In
wood Park Mausoleum Co., Inglewood P
plans underway by W. E. Erkes, 175 N.
troit St., Los Angeles, 1 story, 80x156
rein.-con. mausoleum bldg. addn. $300,

Calif., San Francisco—RADIO STATIO
Associated Broadcasters, Inc., KSFO,
Jessie St., FM radio station. Over $25,

Conn., Southington — SPORTS FIEL
Town, W. H. Strong, supt. Schools, T
Hall, high school sports field, incl. tr
sports, football, baseball, hockey, tennis
soccer facilities. $35,000.

Conn., Stamford—PARK—Town, G.
Close, clk., park, Maple Ave. $25,000.
Bromfield, 137 Main St., engr.

Conn., Windsor—PARK—Town, L.
Hayes, clk., Town Hall, Sage Park devel
ment incl. swimming pool, over $25,
Addnl. land acquired.

Fla., Tampa—RADIO STATION—Trib
Co., WFLA, Lafayette St. and Hyde P
Ave., FM radio station. Over $25,000.

Ga., Atlanta — RADIO STATION—C
Park Realty & Amusement Co., 7840 S. C
tage Grove St., Chicago, Ill., FM ra
station. Over $25,000.

Ill., Chicago — RADIO STATION—E
Network Co., Inc., WERN, 222 B. Bank
FM Radio Station. Over $25,000.

Ill., Chicago—RADIO STATION—WJ
Inc., 230 N. Michigan Ave., FM radio stati
Over $25,000.

Ill., Peoria—RADIO STATION—Peo
Broadcasting Co., Alliance Life Bldg.,
radio station. Over $25,000.

Ill., Springfield—MEMORIAL STADIU
Sangamon County Memorial Assoc., A. L
son, pres., 1440 Monument Ave., memo
stadium seating 10,000, $250,000. Bullard
Bullard, Lincoln Theatre Bldg., M. S. Hain
205½ S. 6 St., H. R. Helmle, First Natio
Bank Bldg., C. T. Meyer, 1924 S. Glenw
St., H. J. Reiger, Security Bldg., archts.
12/1—ENR 12/9.

Ia., Des Moines—RADIO STATION—C
tral Broadcasting Co., WHO, 914 Walnut
FM radio station. Over $25,000.

Ia., Waterloo—RADIO STATION—J
Higgins Broadcasting Co., KXEL, Water
FM radio station. Over $25,000.

Ind., Crawfordsville—AIRPORT—City, a
port, $75,000; swimming pool, $75,000. L.
Clurg, city engr.

Ind., Muncie—RAILWAY RELOCATIO
Cleveland, Cincinnati, Chicago & St. Lo
Ry., F. J. Jerome, LaSalle St. Station, C
cago, Ill., removing railway track from Ma
son St., and main line of road to Fort Way
changing route over another division
point east of city. $60,000 or more.

Ky., Ashland—RADIO STATION—A
land Broadcasting Co., WCMI, Ashland,
radio station. Over $25,000.

Ky., Louisville—RADIO STATION—Co
ler-Journal and Louisville Times, 300 W
Liberty St., FM radio station. Over $25,

Md., Baltimore — BROADCASTING S
TION—Maryland Broadcasting Co., WITH
E. Lexington St., FM broadcasting stati
Over $25,000.

Mass., Boston—RADIO STATION—Colu
bia Broadcasting Sys., Inc., 182 Trem
Ave., FM radio station. Over $25,000.

Mass., Holyoke—FM and TELEVISIO
STATION—Hampden-Hampshire Corp., S
tion WHYN, Holyoke, FM and televi
station, broadcasting facilities, incl.
towers, bldgs., and equipment, Mount T
Over $25,000.

Mich., Dearborn—SWIMMING POOL,
—City, Municipal Bldg., plans 80% co
pleted swimming pool and bathhouse, $1
000. F. R. Storrer, Municipal Bldg., e

★**Mo., Clayton**—AIRPORTS—St. Lo
c/o Co. Court, Court House, Clayton,
Louis, Zone 5, airports, landing strips, t
minals, $1,250,000. R. Jablonsky, Co
House, co. engr.

★**Mo., Clayton** — PARK, etc. — St. Lo
Co., c/o County Court, Court House, Cl
ton, St. Louis, Zone 5, park at Creve Co
Lake, other playgrounds and parks, $1,0
000. R. Jablonsky, co. engr.

Mo., Farmington—AIRPORT—City, a
port, $50,000. B. F. Walther, city engr.

Mo., Maplewood (br. St. Louis, 17)
STREET LIGHTING EXTENSIONS, etc
City, J. Usher, city clk., 7482 Manchester Av
street lighting facilities, extens. $200,

Mo. Rolla — SWIMMING POOL — Ci
swimming pool and general park impr
$50,000. J. F. Kilpatrick, city engr.

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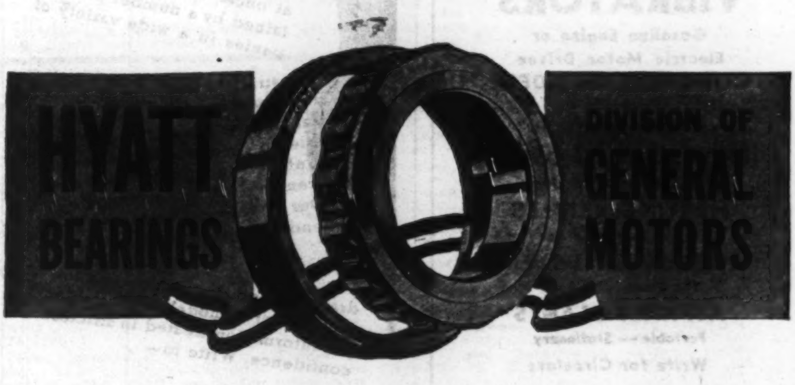

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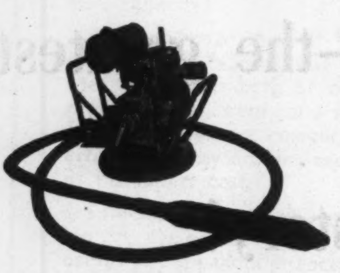

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POSTWAR PROJECTS (Cont'd.)

Mo., St. Louis—RADIO STATION—St. Louis University, WEW, 3642 Lindel St., FM radio station. Over **$25,000**.

N. J., Paterson—RADIO STATION—North Jersey Broadcasting Co., Inc., 7 Church St., FM radio station. Over **$25,000**.

New York—BEACH IMPROVEMENTS—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, preliminary plans 5% completed, CON-30 development of Westcott Beach for Thousand Island State Park Com., Conservation Dpt., **$31,500**. Jones, Davis & Associates, 20 Vesey St., New York, Zone 7.

N. Y., Brentwood—TRACK AND TRESTLE SUPERSTRUCTURE—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed, track and trestle superstructure at Edgewood State Hospital, Proj. MH-69, for Dpt. Mental Hygiene, State Office Bldg., Albany, Zone 1. **$67,000**. Div. Construction, Div. Architecture, C. J. White, comr. Architecture, State Office Bldg., Albany, Zone 1, engr. CD 1/12—ENR 1/27.

N. Y., Jamestown—PARK EXPANSION—City Dpt. P. Wks., City Hall, expan., exten. recreational park facilities. **$75,000**. C. J. Strandburg, city engr.

N. Y., Long Island City—PIER, etc.—Dpt. Marine & Aviation, J. McKenzie, comr., Pier A, North River, New York, plans underway, DS-16, reconstruct pier and bldgs., at Nott Ave. Yard, **$185,000**. State Aid Planning Funds allotted. A. J. Duggan, Sr. civil engr.

New York—COMFORT STATIONS, etc.—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed CON-21 comfort stations, shelter, sewerage sys., at Beaver Island State Park, for Niagara Frontier State Park Comn., Conservation Dpt., **$27,609**. Fretts, Tallamy, Senior & Forrestel, 5488 Main St., Williamsville, archts.

New York—BEACH IMPROVEMENTS—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, preliminary plans underway CON-32 store and refreshment stand, imprvs. to bathing beach, reconstruction power line at Allegheny State Park, for Allegheny State Park Comn., Conservation Dpt., **$30,000**. Fretts, Tallamy, Senior & Forrestel, 5488 Main St., Williamsville, archts.

New York—PARK DEVELOPMENT—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, preliminary plans underway CON-79, developing Hook Mt. State Park area, for Palisades State Park Comn., Conservation Dpt., **$360,000**. Amman & Combs, 681 Fifth Ave., New York, Zone 22, consult. engrs.

N. Y., New York—DEMONSTRATION AREA—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, preliminary plans underway by Harrison, Fouilhoux & Abramovitz, 45 Rockefeller Plaza, Zone 20, and A. Embury II, 150 E. 61 St., Zone 21, demonstration area, Bronx Zoo, for Conservation Dpt., Con. 34, **$225,000**.

N. Y., New York—RADIO STATION—Debs Memorial Radio Fund, Inc., WEVD, 117 W. 46 St., Zone 19, FM radio station. Over **$25,000**.

★**O., Cincinnati** — AMUSEMENT PARK—Coney Island, Inc., 529 Walnut St., plans underway imprv. amusement park, new bldgs., bathhouse, roller coaster, etc. **$1,000,000**. P. G. Hill, 529 Walnut St.; archt.

O., Columbus—SWIMMING POOLS—City, constructing 5 swimming pools, **$50,000** to **$90,000** each. P. W. Maetzel, City Hall, city engr. CD 2/19/43—ENR 3/4/43.

★**O., Elyria** — AIRPORT — Lorain Co., Elyria, $600,000 bond election in November, airport. **$1,500,000**. Financing not yet provided for.

O., Sandusky — CEMETERY IMPROVEMENTS—City, grading, drainage, water lines, landscaping, etc., for cemetery addn. **$40,000**. Financing not yet provided for. R. R. Smith, city engr.

★**S. C., Charleston**—PARKS—City, parks, recreation facilities, **$601,000**. B. M. Thomson, City Hall, city engr.

Tex., Harlingen — AIRPORT — Town, airport. **$100,000**.

Utah, Logan — AIRPORT BLDG. — Logan City and Cache Co., 180 N. Main St., administration bldg., landscape grounds, grade and asphalt surface area between and in front of hangars, reshape, roll existing gutters, construct addnl. drain lines at Logan-Cache Airport. **$69,000**. E. U. Moser, Box 87, engr.

Utah, Logan—POWER LINES, etc.—Logan City Corp.; 180 N. Main St., altering, exten. power lines, installing stream measuring devices, replacing meters, exten. White Way. **$41,194**; removing power and light poles from streets and place in interior of blocks, **$100,000**. E. U. Moser, Box 87, engr.

Wis., Reedsburg—PARK IMPROVEMENTS—City, Wm. H. Dierkin, clk., park imprvs., swimming pool, field house, parking area, landscaping, roads, stadium, **$129,130**. H. C. Amunson, city engr.

Wis., Superior—PARK DEVELOPMENT, etc.—City, R. E. McKeaque, clk., City Hall, plans underway park development **$140,000**; airport, **$25,000**.

★**N. B., St. John**—Dominion Government, Ottawa, Ont., reconstructing Long Wharf, **$3,000,000**; reconstructing McLeod and Pettingel Wharves, **$1,500,000**. Dpt. P. Wks., Ottawa, Ont., engr.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.
ELSIE EAVES, Manager *SCOTT McLEOD, Statistics* *J. A. MAHONEY, Reports*
(Daily service also available—Write for details)

WATER SUPPLY

OSED WORK

Mobile — City, water distr. sys. 107,570 ft. 6 to 16 in. pipe and 6,000 ft. 2 and 4 in. domestic sup- ines, etc. Ala. 1-288-N. $354,500 **FWA.**

Sayre—Public Housing Auth., NHA, s Savings Bank Bldg., Peachtree and Sts., Atlanta, 3, Ga., 1,626 ft. 8 in. and approx. 1,271 lin. ft. 8 in. outfall line, incl. manholes and necessary rtenances, Ala. 1-287-F. Est. $6,857.

Burbank—City, installing 25,000 ft. 24 in. c.i. pipe, Spec. 315, Calif. F (non-Federal). $35,000. Public Serv- pt., City Hall, engr.

Hogansville—City, J. R. Hines, mayor, ed bids July 31,* imprv. pump. sta. and filtration plant. Project postponed. —ENR 8/10, under LB.

Chicago—City, Dpt. Pub. Wks., re- cted bids July 10, superstructures of bldg. and administration bldg., of South Filtration Plant, Lake Front, east of Shore Dr. and north of E. 79 St. Will vertise. CD 7/12—ENR 7/20 under LB.

Des Plaines—City, 1 gpmc. well and house with pump, equip. and addnl. lift pump. equip., Ill. 11-312-N $70,260.

Tell City—Bd. Pub. Wks., W. Werner, r and chn., 400,000 gal. water storage

Troy—City, F. X. Bumm, clk , WW $42,000.

Alliance—City, new watermains. $25,-

Arlington — Arlington County Bd., gton, waterworks sys., 500,000 ga. cap. storage standpipe, installing water- valves etc. Va. 44-416-N. $45,000.

Portsmouth—Bd. Supervs. Norfolk Portsmouth, 34,200 ft. 2 to 8 in. water- 38 hydrants, valves, etc., Tanners Dist., Va. 44-406-N. $72,900. **FWA.**

Scottsville—Town, water supply sys., well centrifugal pump, 15,000 gal. ele- wooden wash water tank, altering filtration plant, Va. 44-409-N. $11,- FWA.

South Porcupine—Municipality, W. F. t, clk., Porcupine, WW sys. $40,000. & Storrie, 1130 Bay St., Toronto, engrs.

Grondines—Municipality, C. V. La- re, clk., concrete reservoir, 6 and 8 in. mains, 3,000 ft. concrete piping. $40,000. Morrissette, 15 Longval St., Cap de la leine, engr.

Maskinonge—A. Lemire, Maskinonge, sys. addn. $30,000.

St. Prosper—Municipality, A. Gravel, concrete reservoir, 8 and 10 in. c.i. s $50,000. R. Morrissette, 15 Longval Cap de la Madeleine, engr.

Ste. Genevieve—L'Aqueduc des Lau- ides, Ltd., A. Vezina, supt., Ste. Genevi- concrete reservoir, 6 and 8 in. c.i. mains. 000.

S ASKED

Bids Asked August 29

Chilton—City, O. A. Horst, clk., 3 phouses, reservoirs, remodeling pump. McMahon Engrg. Co., 124 Main St., asha, engrs. CD 10/20—ENR 10/28.

Bids Asked September 1

Denton—City, R. B. Neale, secy., ng water well. Plans deposit $25.

Bids Asked September 11

Hartford—Bd. Contract & Supply ropolitan Dist., R. Dillon, clk., 650 Main reconditioning Nepaug Pipe Line No. 1, r. 81 in Burlington, Avon and Farming- Plans deposit $5; adv. ENR 8/24.

North East—Boro, H. Lewis Willert, 16 and 12 in. water mains. Plans de- $5. Hill & Hill Engineers, North East,

Bids Asked September 19

Lewisburg—T. L. Cathey, mayor, Town Comrs., City Hall, addnl. water y facilities, incl. 1 m.g.c.d. filtration river pump. sta., approx. 9 mi. 12 in. pply pipe and transmission line. Plans it $25. Wiedeman & Singleton, 1303 s and Southern Bank Bldg., Atlanta, ngrs.; adv. ENR 8/24.

Location of ENR Correspondents

Symbols and Abbreviations Include:

✝	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED: (except Streets & Roads):
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

LOW BIDDERS

Calif., Napa—City, Aug. 15, 50 ft. high, gravity section concrete dam from Stanley Koller, 1694 Pomona St., Crockett, **$86,966.** CD 7/28—ENR 8/3.

Calif., Oakland—East Bay Utility Dist., D. Read, secy., 512 16 St., installing watermains in Alameda, LS 316, from M. Murphy, 734 Santa Fe Ave., Albany, **$20,296.**

N. J., Newark—City of Newark, Aug. 15, cleaning, lining 21,000 ft. 48 in. riveted steel pipeline with cement mortar protective coating at Pequannock Aqueduct, Wayne and Great Notch, from J. Nesto & Co., 372 Bway., **$52,290.** CD 8/11.

Tex., Houston—City, M. H. Westerman, secy., drilling. developing and test 6 water wells, in S.W. water well field, from Layne-Texas Co. Box 9098, **$221,330.** Bids 8/9. CD 7/28.

Tex., Houston—City, M. H. Westerman, secy., Aug. 16, furnishing unit substation, part of power contl. equip. for water well pumps and high service pumps at S.W. water well field, from Westinghouse Elec. Co., 1314 Texas Ave., **$52,484*****furnishing, installing 6 motor-driven deep well pumps, from Byron-Jackson Co., 6247 Navigation Blvd., **$28,932*****furnishing underground electric cable for transmitting power and pump. water wells, from Phelps-Dodge Corp., Habirshaw Div., 1011 Wood St., **$17,177.** CD 7/31 and 8/1—ENR 8/3.

Tex., Houston—City, c/o M. H. Westerman, secy., Aug. 16, approx. 9,000 ft. 20 in. c.i. watermain crossing White Oak Bayou, from C. W. George, 1600 Midway St., **$93,686,** using mech. joints. CD 8/10.

CONTRACTS AWARDED

Ala., Glencoe—Town, WW sys., to Murray-Cook Constr. Co., Buena Vista, Ga., **$40,000.** Est. $50,000. Bids 8/10. CD 7/31—ENR 8/3

Ala., Normal—State Agricultural & Mechanical Institute, Normal, addn. watermains, etc., to Sullivan, Long & Hagerty Co., Bessemer, **$15,000.** Polglaze & Basenberg Co., Empire Bldg., Birmingham, engrs.

✝Calif., Camp Elliott (San Diego)—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., water sys. imprvs., NOY 8533, to Shipyard Constr. Co., 2609 Cherry Ave., Long Beach, **$49,996.** CD 7/18 under LB.

Calif., La Verne—Met. Water Dist. of Southern California, 306 W. 3 St., Los Angeles, salt storage basin No. 3 at water softening plant, to Norman I. Fadel, 7101 Radford Ave., North Hollywood, **$19,217.** Bids 8/8.

Conn., Mystic—Mystic Valley Water Co., 129 Water St., water pipeline, underwater, to Elliott & Watrous, Inc., Crest Ave., East Providence, R. I. Est. **$17,000.**

✝Md., Hagerstown—At office Mayor, City Hall, brick, concrete, 10 m.g.c.d. booster pump. station, on bank of Potomac River, Md. 18-114 to Dravo Corp., Broad St. Sta. Bldg., Phila., Pa., **$18,579. FWA.** Bids 7/8. —CD 6/20—ENR 6/22.

✝S. D., Pierre—U. S. Eng., 1709 Jackson St., Omaha, Neb., pipeline with pump. and storage to complete water supply sys. to W. J. Parker Const. Co., 614 Standard Oil Bldg., Omaha, Neb., **$66,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

✝Fla., Jacksonville—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., architect-engineering services, by Whitman, Requardt & Assoc., 1304 St. Paul St., Baltimore, Md., sewage tr. and industrial waste disposal facilities, Naval Air Station.

Ind., Anderson—Bd. Pub. Wks., C. D. Rotruck, mayor, making surveys exten. sewage treatment plant and sewerage sys. Greeley & Hansen, 6 N. Michigan Ave., Chicago, Ill., consult. engrs. Herbert L. Gwinnup, city engr.

Md., Baltimore — Sewer Dpt., Municipal Bldg., plans sewage pump. stat. $330,000.

✝Nev., Pioche—Lincoln Co., Pioche, approx. 9,940 ft. 6 and 8 in. sewers, 38 manholes, rein.-con. septic tank, etc., Nev. 26-132-F. $50,000. **FWA.**

Ore., Tillamook—City, sewage disposal sys. $78,164.

Tex., Houston—City c/o M. H. Westerman, secy., storm sewers, Lawrence St., West 16 to West 20S Sts.; West 20 St. from N. Shepherd Dr. to Nicholson St.; Nicholson St. from West 19 to West 20 Sts., West 23 St. from N. Shepherd Dr. to Nicholson Sts.; North Shepherd Dr. from West 20 to West 21 Sts. and from West 22 to West 28 Sts. $290,000. Joe. Dannenbaum, city engr.

Wis., Portage—Mrs. Frances Wright, city clk., City Hall, rejected bids July 6, imprv. sewage tr. plant. General Eng. Co., Portage, engr. CD 6/28—ENR 6/22.

Man., Winnipeg—Ratepayer to vote on bonds storm sewers. $5,000,000. Alvord, Burdick & Howson, 20 N. Wacker Dr., Chicago, Ill., consult. engrs. CD 3/24—ENR 4/1.

Ont., Fort Francis—Town, J. W. Walker, clk., sewage treatment plant. $150,000-$200,000. Gore & Storrie, 1130 Bay St., Toronto, engrs.

BIDS ASKED

Bids Asked August 28

Ont., Toronto—J. T. Stewart, clk., Scarborough Twp., 1660 Kingston Rd., lateral sewers and watermains, various streets. $30,000. E. M. Baird, 1683 Kingston Rd., engr.

Bids Asked August 29

N. Y., Brooklyn—President Brooklyn Boro, Borough Hall, Zone 2, storm and sanitary sewers in Gerritsen Ave., Batchelder St., Aves. R and S, combined sewer and St. grading E. 93 St.

N. Y., Mineola—Bd. Supervs. Nassau Co., Old Court House, alterations, addns. sewage disposal plant, Farmingdale. CD 8/16.

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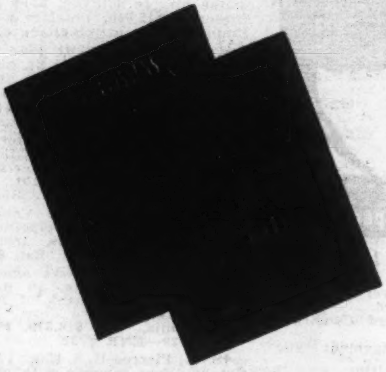

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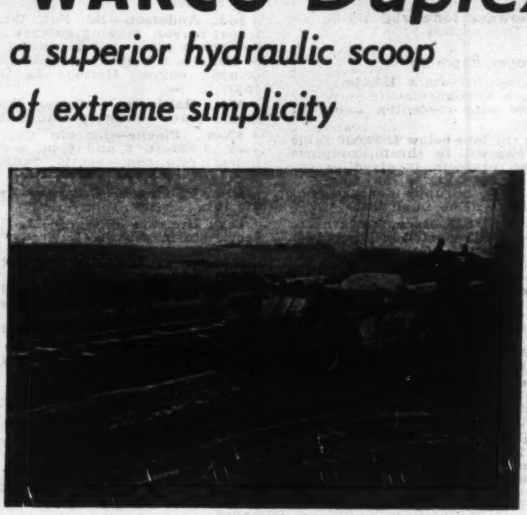

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**SEWERS, WASTE DISPOSAL, etc.
As'ked, Cont'd)**

Bids Asked August 31

Ill., Chicago—Jas. M. Whalen, chn.
Com., 910 S. Michigan Ave., altering
generating unit No. 1, altering to
connections and ducts of vapor heate
1A and 1B, etc., at Southwest
Treatment Works, "AL", in Stickney,
Sanitary Dist. of Chicago, 910 S. Mich
Ave.

Ill., Chicago—J. M. Whalen, chn.
com., Sanitary Dist. of Chicago, 910 S.
gan Ave., addnl. sludge lagoons at Cal
Sewage Treatment Works, involving
ing approx. 11,000 cu. yd. earth furnis
placing timber control boxes and vitr.
pipe, etc., Contr. 44-45 (CL-P). Plans
posit $10.

Bids Asked September 6

Tex., Austin—City, c/o W. E. Seal
act. mgr., storm sewer, Kinney Ave.,
ginia to Ashby Aves.; rein.-con cu
across Windsor Rd. at Sharon Lane;
con. culvert across Chestnut Ave., sou
16 St. J. E. Motheral, City Hall, A
engr.

Bids Asked September 12

Calif., Los Angeles—Bd. Superva
Angeles Co. 53,360 ft. 6 to 10-in. vtr.
sanitary sewers, Northside Dr., etc., CL
$150,000. A. Jones, Hall of Records,
CD 7/17—ENR 7/20.

LOW BIDDERS

Calif., Mojave — Mojave Utility
Mojave, v.c. pipe sanitary sewer from Ed
Green, 3001 Coolidge Ave., Los An
$60,795. R. E. White, 2617—20 St., Ba
field, engr.

CONTRACTS AWARDED

Conn., Groton—Boro, sanitary sewers
rious streets, to Fred Onuparik, 501
St., New London, **$42,530.** Bids 8/14.
8/11.

Mich., Lansing—Ingham Co., Geo. Gra
drain comr., Township Hall, Glendale
8-33 in vitr. and concrete pipe covered
for North Branch Holmes Drain, vi
Lansing, to John & Paul Gillissee, Gr
ville, **$65,787.** Wolverine Eng. Co., M
engrs.

N. Y., Brooklyn — President Broo
Borough, Borough Hall, Zone 2, storm
sanitary sewers, Avenue R, etc. to Toma
Const. Co. Inc., 1066 60 St., Brooklyn,
19, **$194,781.** Bids 8/3. CD 7/25—ENR

B. C., Dawson Creek—Dpt. Trans
Ottawa, Ont., sewerage sys., to Coast Co
Co., Ltd., 510 W. Hastings St., Vanco
$15,000. Bids 8/14. CD 8/2—ENR 8/10.

BRIDGES

BIDS ASKED

Bids Asked August 29

Maryland—State Roads Comn., Baltim
composite timber-concrete bridge on tre
timber piles over Cabin Creek, on Pre
East New Market Rd. Contr. D 115-
Dorchester Co.

Ontario—J. D. Miller, deputy minister
Hys., Toronto, altering, 1⅛ mi. approa
to Little Long Lac Bridge, Long Lac.
Hys., Toronto, engrs.

Bids Asked August 30

Arkansas—J. H. Crain, chn. State
Dpt., Little Rock, 186 ft. rein.-con. br
Benton Co.; 0.206 mi. grading, etc. and
511 ft. treated timber bridge, Carroll
0.145 mi grading, one 382 ft. rein.-
struct. steel bridge over Little Red R
Cleburne Co. W. W. Mitchell, Little R
engr.

Bids Asked August 31

Ill., Beardstown—City Clerk, City Hal
Hazelet & Erdal, consult. engrs., 53 N. J
son Blvd., Chicago, replacing swing spa
existing center pier. Over $100,000.
deposit $2.

Louisiana—Dpt. Hys., D. Y. Smith,
Baton Rouge, bridge over Bayou Blac
Gibson, on Morgan City Houma Hy.,
Nos. 5-03-5 and 5-04-06, FA Projects
132-B (3) and FAP 132-A (2), Terrebo
Parish, State Route 2. (Readvertisement

Bids Asked September 1

Missouri—State Hy. Comn., Jefferson
two 70 ft. and one 80 ft. continuous I-b
spans over Big Creek, Sta. 94 plus 77, J
son Co., over $25,000; new lower bases
Bents 5 to 12 (inclusive) over Missouri R
Sta. 289 plus 48, Jackson Co., over $25,
two 46 ft. and one 51 ft. continuous conc
encased I-beam spans, K.C.S. railroad un
pass, Sta. 159 plus 07, McDonald Co.,
$25,000. C. W. Brown, ch. engr.

Bids Asked September 6

Louisiana—State Hy. Dpt., D. Y. Sm
dir., Baton Rouge, remove, repair and
erect. east leaf of bascule span, drive
ferdam, repair. east pier, remov. and reb
damaged east fender, remov., replac.
existing submarine cable, etc., East
Ave. Bridge over Intracoastal Canal. Hou
State Route 965, S.P. 855-04-06, Terreb
Parish; modification Caddo Lake Bri
north of Mooringsport, Old State Rout
S.P. 78-03-01, Caddo Parish.

AEGER "SURE PRIME"

—the Pumps that exceed their promises

ith up to 5 times faster priming, with -head, hi-capacity performance, with thousands of extra hours of trouble-free service.

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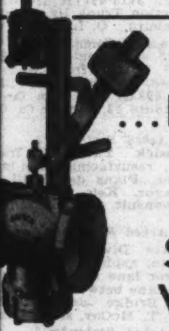
HECK VALVES



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ALVE SPECIALTY CO.
lton Bldg. Pittsburgh, Pa.

BRIDGES, etc. (Bids Asked, Cont'd.)

Bids Asked September 7

California—State Div. Hys., State Bldg., Los Angeles, repairing bridge across Arroyo Simi at Simi and across Castaic Creek near Castaic Jct., constructing culvert at Sta. 255, plus 06, VII-Ven, La-9,4,79-C, A, B, in Ventura and Los Angeles Counties; G. T. McCoy, Pub. Wks. Bldg., Sacramento, engr.

Bids Asked September 8

Kentucky—Dpt. Hys., Frankford, underpass at C & O Tracks Salyersville-Prestonsburg Rd., near Ivyton, FAGS 267 C (2) SP 77-40, Magoffin Co., timber floor and repairing bridge over north fork of Kentucky River at Quicksand, RP 13-187, Breathitt Co.

LOW BIDDERS

★**California**—State Div. Hys., Sacramento, Aug. 16, reconstructing portion bridge across Sacramento River at Rio Vista, Sacramento Co., from A. Soda & Son, 5231 Grove St., Oakland, **$784,629.** CD 7/28—ENR 8/3.

Illinois—State Div. Hys., Springfield, Aug. 18, 61 ft. rein.-con. girder bridge, McLean and Livingston Counties, from Arcole-Midwest Corp., 221 N. La Salle St., Chicago. $33,556. CD 8/10, under Roads.

Louisiana—State Dpt. Hys., Baton Rouge, Aug. 16, imprv. bridge over Bayou Black, Terrebone Parish, from Robinson & Young, 910 Louisiana National Bank Bldg., Baton Rouge, **$146,175.** CD 7/24—ENR 7/27.

Maryland—State Roads Comn., Baltimore, Aug. 15, continuous concrete slab bridge, Contr. Ce-238-2-257, Cecil Co., from Kelly Pile & Found. Corp., 827 Remsen Ave., Brooklyn, N. Y., **$53,493.** CD 8/8—ENR 8/10.

Pennsylvania—Dpt. Hys., Harrisburg, Aug. 15, constructing Traceyville Bridge, Wayne Co., from Whittaker & Diehl Co., Calder Bldg., Harrisburg, **$75,174;** Paupack-Eddy River Bridge, Wayne Co., from G. A. and F. M. Wagman, Dallastown, **$93,099.** CD 8/2—ENR 8/10 under Roads.

CONTRACTS AWARDED

N. J., Brielle—New York & Long Branch R.R., A. M. Zabriskie, ch. engr., 143 Liberty St., New York, N. Y., repairing Railroad Bridges 1, 13, 16, 18, 22 and 26, on westerly abutments, to Ell-Dorer Contg. Co., 644 Nye Ave., Irvington, **$32,346.**

Washington—State Hy. Dpt., Olympia, reconstructing timber pier protection around 2 channel piers of Snohomish River Bridge, Primary State Hy. 15, Snohomish Co., to C. W. Larson, 466 Colman Bldg., Seattle 4, **$27,765.** Bids 8/15, CD 8/4.

STREETS AND ROADS

BIDS ASKED

Bids Asked August 28

Mass., Boston—P. Wks. Dpt., City Hall, bituminous concrete paving Alvah Kittredge Park, Cabot St., Guild Row, Highland Ave., Kenilworth and Norfolk Sts. $33,000. Plans deposit $2.

New Jersey—State Hy. Dpt., Trenton, constructing 0.957 mi. roadway approaches to Berry's Creek viaduct and overhead bridge for Route 3, southbound, over Route S-3, westbound, Bergen Co. Spencer Miller, Jr., comr.

Bids Asked August 29

Maryland—State Roads Comn., Baltimore, grading, drainage, rein.-con. surfacing 2.653 mi. Pocomoke-Virginia Line Rd., Contr. WO 223-3-146, Worcester Co.; 4.735 mi. sect. Cambridge-Vienna Rd., Contr. D 144-146, Dorchester Co.

Mass., Boston—P. Wks. Dpt., City Hall, bituminous concrete paving Cottage, Emmons, Marion, Maverick, Moore, New and Prescott Sts. $60,000. Plans deposit $2.

Pennsylvania—John U. Shroyer, secy. Dpt. Hys., Harrisburg, constructing 0.35 mi. rein.-con. pavement, 9 ft. and variable in width also bituminous surfacing 6.6 ft. on crushed aggregate base U. S. Route 422 between Phila. and Norristown, Whitemarsh and Plymouth Twps., Montgomery Co. Plans deposit $2.50; bituminous surfacing on native stone or crushed aggregate 0.85 mi. Traffic Route 160, Sumerhill Twp.; Wilmore Boro, Cambria Co. Plans deposit $2.50; repairing bridge over Youghiogheny River at Confluence, Fayette and Somerset Counties, (readvertisement from July 6 letting) Plans deposit $2.50. CD 6/26.

West Virginia—State Road Comn., D. McClaugherty, secy., Charleston, modified road mix and surface treatment 0.9 mi. Richwood-Mill Point Rd., S. P. 3677, Greenbrier Co.; 6.1 mi. Richwood-Mill Point Rd. S. P. 39-D, Pocahontas Co.; road mix surfacing 4 mi. Shinnston-Robinson Run Rd., Proj. DARM 41-a(1), Harrison Co.; grading, draining, concrete pavement and guard rail 1.295 mi. St. Albans-Lewis Rd. SNFA 249-A(2), SNFA 249-B(3) and SNFA 249-D (1), Kanawha Co.

Ontario—J. D. Miller, deputy minister Dpt. Hys., Toronto, embankment along Hy. 35, Orono. Dpt. Hys., Toronto, engrs.

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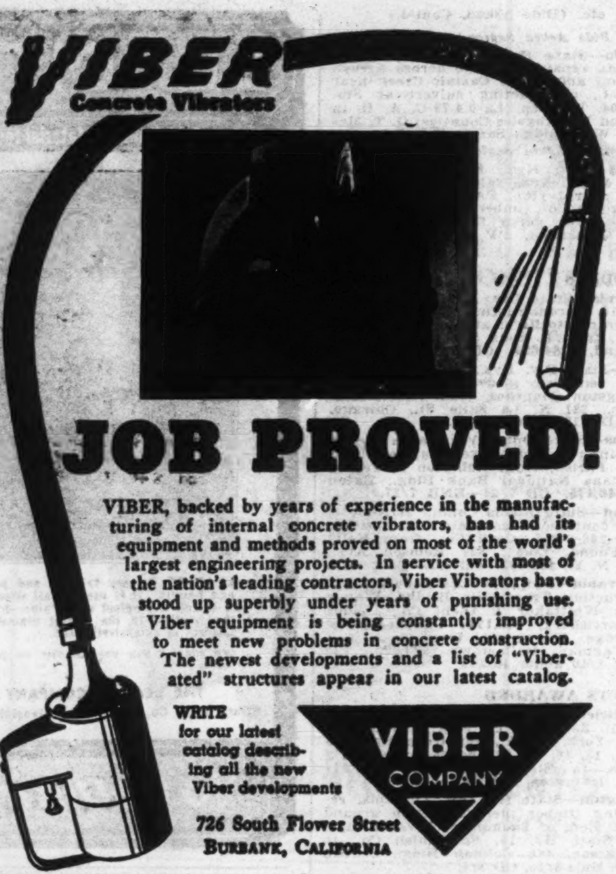

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NO PROJECT TOO LARGE—NONE TOO SMALL
155 East 44th Street New York 17, N.Y.

STREETS, etc. (Bids Asked, Cont'd.)

Ontario—J. D. Millar, deputy minis Dpt. Hys., Toronto, grading 10 mi. betw airport and Moonbeam, (raising grad $40,000.

Bids Asked August 30

Arkansas—J. H. Crain, chn. State Dpt., Little Rock, gravel surfacing 2.66 Ferguson-West Rd., Phillips Co., 3.2 Felton-Smiths Corner Rd., Lee Co.; bi minous surfacing 0.946 mi. Hamburg C nection Rd., Ashley Co.; grading, draini gravel base course, bituminous surfaci 4.352 mi. Sweet Home Cut-off Rd.-W.E Proj. #DARM 17-D(1), Pulaski Co. W. Mitchell, Little Rock, engr.

Miss., Greenville—City, Edw. M. Gr mayor, paving Alexander, Euicha, Ced McAlister, Gulf and Lotus Sts. $80,0 Election Aug. 29 to vote on $55,000 bon J. B. Williams, Yazoo City, engr.

N. Y., New York—President Bronx Bo Bronx County Bldg., 851 Grand Concour New York, Zone 31, bituminous concr (preliminary pavement), on existing cadam paving Seward, Noble, Lafaye Aves.; asphalt paving (permanent), M calf Ave.; asphalt block on concrete p ing E. 176 St.; asphalt block repaving 174 St.

Bids Asked August 31

Louisiana—State Hy. Dpt., D. Y. Smi dir., Baton Rouge, bituminous on clay gravel base surfacing 2.057 mi. Ridder Airport Access Hy., State Rte. S. P. 28-03-05, Defense Access Army Res vation Project DA-WR 36 (1), Beaureg Parish.

S. C., Charleston—H. M. Lilienthal, purch. agt., City Hall, approx. 40,000 lin. granite or concrete curb on various stre Northwest Paving Dist. B. M. Thoma City Hall, engr.

Virginia—Dpt. Hys., Richmond, bound macadam surface treating 0.393 Route 11, Shenandoah Co., 3.6 mi. R 175, Accomac Co.; cement stabilization face treating 7.3 mi. Route 198, Glouce Co.

Illinois—State Div. Hys., Springfield, crete paving 6.41 mi. Sect. 16R, S.N.-F Proj. 26(16) (2) F. A. Route 5, Dist. over $100,000; 4.08 mi. Sect. 17R, S.N.-F Proj. 26 (17) (2) F. A. Route 5, Dist. over $100,000; grading 1.76 mi. Sect. 17 S.N.-F.A. Proj. 26(17) (2) F. A. Route Dist. 4, over $25,000, one 49 ft. and tw ft. rein.-con. girder bridge over Ti Creek, Sect. 17-R-B, S.N.-F.A. Proj. 26((2) F. A. Route 5, Dist. 4, $25,000, all Lean Co. W. W. Polk, ch. engr.

Ill., Carlyle—J. T. Goldsmith, Clinton Supt. Hys. County Bldg., gravel or cru stone surfacing 3.8936 mi. 8-MFT. $25,000. Plans deposit $10. Bids 8/15 jected. CD 8/8—ENR 8/10.

Kansas—State Hy. Dpt., Ottawa, re facing material 6.6 mi. Proj. 4768, Bour Co.; 6.767 mi. Proj., 4769 and 1.162 Proj. 4770 both Franklin Co.; 3 mi. P 4771, Linn Co.; 3 mi. Proj. 4772, Miami R. C. Keeling, Topeka, engr.

Minnesota — State Hy. Dpt., St. P regrading 8.6 mi. State Project 3406-02(17-210) and S.P. 3415-02(TH 104-143) tween West Junction Trunk Hy. 104 and mi. south of Sunburg. O. L. Kipp, ch.

Missouri—State Hy. Comn., Jefferson C grading, concrete surfacing 0.568 mi. Ro 71-SN-FAGH-146 B (1) from Newton south to Goodman, McDonald Co.; 0.133 Route SC-FAS 498-B (2) from Cass east toward A Route 13, Johnson Co. C. Brown, ch. engr.

Bids Asked September 5

N. Y., Hoosick Falls—Bd. Trust Municipal Bldg., resurfacing, street imp and storm sewer. Plans deposit $25. J P. Murphy, mayor. Keis & Holroyd, Bway., Troy, consult. engrs.; adv. Aug. 24.

Bids Asked September 6

California—State Div. Hys., Pub. Bldg., Sacramento, asphalt surfacing 0.6 concrete passenger lane and concrete wid ing 0.2 mi. truck lane between San Franci Oakland Bay Bridge and Toll Pl Alameda Co. G. T. McCoy, state hy. eng

Bids Asked September 7

California—State Div. Hys., State B Los Angeles, grading, surfacing with mix asphaltic concrete and concrete 2.1 Woodley Ave. between Southern Pacific and Sherman Way and on Sepulveda B and Valjean Ave., Dist. VII, Los Ang Los Angeles Co.; grading, plant mix sur ing 3.6 mi. between I St. in Chula V and South Harbor Dr. at 7 St. in Nati City, XI-SD-Bay Blvd., San Diego Co. G McCoy, Pub. Wks. Bldg., Sacramento, hy. engr.

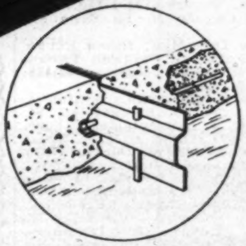
Bids Asked September 8

Kentucky—Dpt. Hys., Frankfort, bit inous surfacing 11.73 mi. Columbia- monton Rd., SP 1-130, Adair Co.; 16 mi. Greensburg-Edmonton Rd., SP 44- 85-4, Green and Metcalf Counties.

Bids Asked September 14

Ill., Glencoe—J. C. Harkness, city Proposal 1 maintenance bituminous crete pavement on 1.2053 mi., Proposal bituminous surface treating 3.8566 mi. $25,000. Plans deposit $5 each. J. Williams, city engr.

Keystone TONGUE AND GROOVE CONSTRUCTION GIVES MAXIMUM JOINT EFFICIENCY—USE IT *Longitudinally and Transversally*



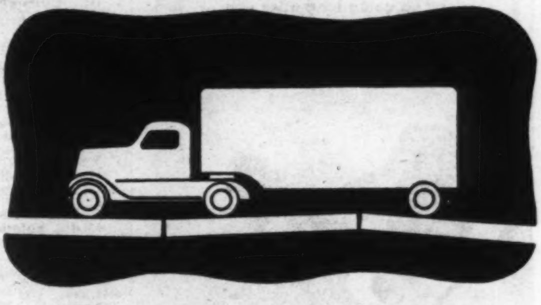
'The Keystone of the pavement

LONGITUDINAL JOINT EFFICIENCY

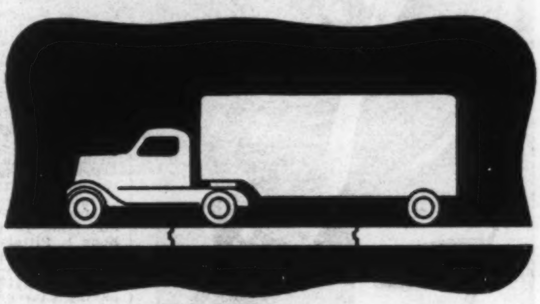
Average Values for Tests at a Number of Points
(Taken from *Public Roads*, August, 1939)

TYPE OF JOINT	Spacing of Tie Bars Inches	Diameter of Bars Inches	Joint Efficiency Per Cent
ngular Tongue and Groove......	60	½	75
ctangular Tongue and Groove....	60	½	78
angular Tongue and Groove.....	None	—	50
....	24	¾	52
....	36	¾	42
....	48	¾	51
....	60	¾	47
ny	60	½	44
ny	None	—	39

Tongue and Groove type joint.



Key your pavement slabs together—



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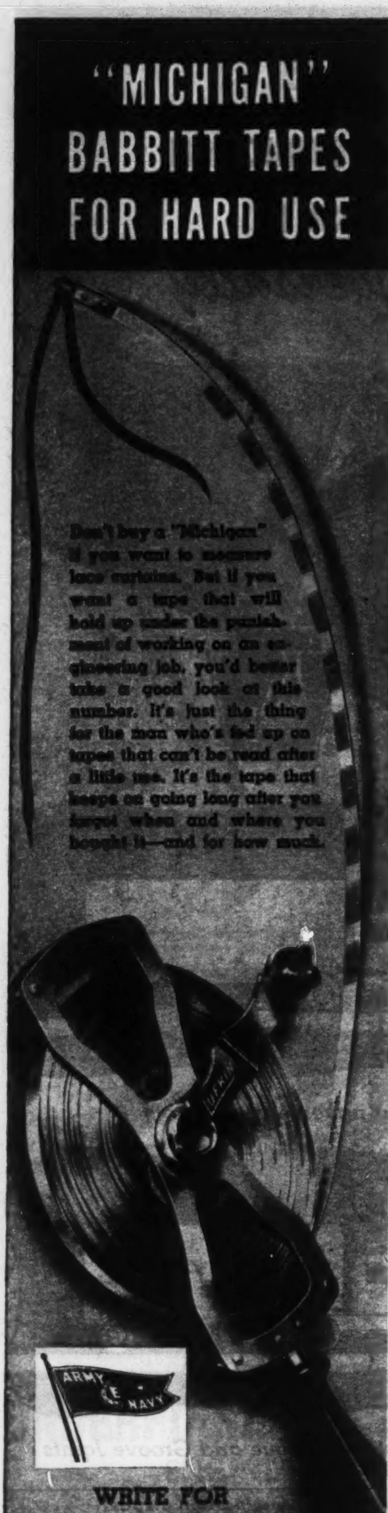
MANUFACTURING PLANT • CHICAGO HEIGHTS, ILL.

PREMOULDED ASPHALT AND FIBRE EXPANSION JOINTS AND ACCESSORIES. JOINT SEALING COMPOUNDS AND CRACK FILLERS



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LUFKIN

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TAPES · RULES · PRECISION TOOLS

STREETS, etc. (Bids Asked, Cont'd.)

Bids Asked September 15

R. I., Newport—City, P. Wks. Dpt., City Hall, widening Bath Rd. Over $25,000. Charles Maguire & Associates, 1515 Turks Head Bldg., Providence, engrs.

Bids Asked

Minnesota—State Hy. Dpt., St. Paul, rejected bids Aug. 4, imprv. 2.7 mi. S.P. 0608-24 and 7305-20. CD 7/19—ENR 7/27.

†R. I., Newport—City, P. Wks. Dpt., City Hall, rejected bids 8/14, paving Guard, Van Zandt and Eustis Sts., Contr. 3, R. I. 37-164-N. **FWA.** Revising plans. Charles Maguire & Assocates, 1515 Turks Head Bldg., Providence, engrs. CD 8/8—ENR 8/10.

Texas—State Hy. Comn., Austin, rejected bids Aug. 1, imprv. 1.999 mi. Collin Co. and 1.46 mi. Comal Co. CD 7/27—ENR 8/10 under LB.

LOW BIDDERS

California—State Div. Hys., Sacramento, Aug. 16, imprv. 3.8 mi. Kern Co., from Griffith Co., 1060 S. Bway., Los Angeles, **$35,595;** 0.5 mi. Alameda Co., from Lee J. Immel, Box 65, Station A, Berkeley, **$75,942.** CD 7/28 and 8/4—ENR 8/3.

D. C., Wash.—District Comrs., District Bldg., Aug. 11, 14,500 sq. yd. cement concrete sidewalks, from American Excav. Corp., 3616 Fulton St., N.W., **$38,653.** CD 8/7.

Florida — State Road Dpt., Tallahassee, Aug. 8, imprv. 13.521 mi. Pasco and Pinellas Counties, also 16.56 mi. Alachua and Levy Counties, to L. J. and W. L. Cobb, Inc., 1102—22 St., Tampa, **$58,284** and **$146,183** respectively***1.6 mi. Palm Beach Co., to Belcher Oil Co., 1217 Biscayne Blvd., Miami, **$24,868*****6.35 mi. Flagler and St. Johns Counties, to Hall & Caddell, Box 2217, Jacksonville, **$32,569*****0.852 mi. Alachua Co., to Duval Eng. & Contg. Co., foot E. Adams St., Jacksonville, **$39,643;** 8.306 mi. Alachua Co., to Langston Constr. Co., Orlando, **$31,590.** Grand total $333,137. CD 7/24—ENR 7/27.

★**Illinois**—State Div. Hys., Springfield, Aug. 18, imprv. 7.98 mi. McLean and Livingston Counties, and 6.34 mi. Livingston Co., from White Consolidated, Inc., 1735 W. Fullerton St., Chicago, **$566,461** and **$425,367** respectively; Aug. 2, 0.89 mi. Peoria Co., from Clark Bros. Co., 724 Kansas Ave., Peoria, **$116,246.** CD 8/10.

Ill., Chicago—Cook Co., Aug. 14, imprv. 4.0089 mi. P. 203-0104.1-15d, and 4.2184 mi. P. 203-0508.1-15d, from Roadway Eng. Co., 210 E. Ohio St., **$29,609** and **$26,123** respectively; 3.9801 mi. P. 198-0206.1-15d. From Crown Rock Sales Co., 30 N. La Salle St., **$28,221;** 1.2771 mi. P. 026-0102-1-15d, from Standard Paving Co., 30 N. La Salle St., **$25,780.** CD 8/8.

Louisiana—State Dpt. Hys., Baton Rouge, Aug. 16, imprv. 8.907 mi. Caldwell Parish, from T. L. James & Co., Inc., Ruston, **$52,478.** CD 8/7—ENR 8/10.

Maryland—State Roads Comn., Baltimore, Aug. 15, imprv. 3.234 mi. SM 263-566, St. Mary's Co., from C. J. Langenfelder & Sons, Rosedale, **$86,949.** CD 8/10.

†Md., Solomons—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., Aug. 14, resurfacing roads at Naval Amphibious Training Base, NOY 10467, from T. Edgie Russell, Frederick, **$54,390.** CD 8/8.

Nebraska—Dpt. Roads, & Irrigation, Lincoln, Aug. 10, imprv. 7.3 mi. road No. 304-c, Winslow-Uehling, Dodge Co., from Francis R. Orshek Co., Fremont, **$106,364***** 13.5 mi. Rd. 7-A, Clay Center-Superior, Nuckolls Co. and 10.7 mi. No. 277-B and C, Antioch-Ellsworth Rd., Sheridan Co., from Peter Kiewit Sons Co., Omaha Natl. Bank Bldg., Omaha, **$131,338** and **$112,573** respectively*** 2.3 mi. Rd. 276-A, Cairo-Ravenna, Hall Co., from Northwestern Eng. Co., Rapid City, S. D., **$36,103*****5.5 mi. No. 269-B, Laurel-Wayne, Cedar and Dixon Counties from Roberts Const. Co., 1018 Terminal Bldg., Lincoln, **$82,584.** CD 8/1—ENR 8/3.

Pennsylvania—Dpt. Hys., Harrisburg, Aug. 15, imprv. 0.73 mi. Bucks and Montgomery Counties, from De Vincentis Constr. Co., 1313 S. Broad St., Phila., **$42,180;** 0.82 mi. Indiana Co., from D. D. Mullett, 3424 Liberty Ave., Zone 1, Pittsburgh, **$145,376.** CD 8/20—ENR 8/10.

Tex., Dallas—Dallas Co., c/o A. Templeton, judge, Aug. 17, grading, drainage structures paving Clarendon Dr., from Texas Bitulithic Co., 111 W. Commerce St., **$28,427.** CD 8/9.

†Wis., Merrimac—U. S. Eng., 408 Federal Bldg., Milwaukee, Aug. 11, resurfacing roads at Badger Ordnance plant, from Barber Paving & Engrg. Co., 7 S. Dearborn St., Chicago, Ill., **$148,465.** Hercules Powder Co., 908 Market St., Wilmington, Del., operator. Mason & Hanger Co., 500 5 Ave., New York, N. Y., engrs. and archts.

CONTRACTS AWARDED

Alabama—State Hy. Dpt., Montgomery, imprv. 3.152 mi. Dallas Co., to E. J. and W. L. Cobb, Inc., 803 Mobile Rd., Montgomery, **$95,570.** Bids 8/4. CD 7/25—ENR 7/27.

Ala., Birmingham—Comrs. Jefferson Co., imprv. 4.6 mi. Mulga Loop Rd., to Warren Bros. Roads Co., 1st National Bank Bldg., **$30,903;** 5 mi. Chalkville-Clay Rd., to So. Ameisite Asphalt Co., 3401 5 Ave., N., **$36,169.** Bids 8/8. CD 7/12—ENR 7/20.

Ala., Montgomery—D. G. Bradley Realty Co., Montgomery, Sub-Division street imprvs., incl. storm and sanitary sewers, water mains, etc., to B. M. Royster Co., Montgomery, **$11,000.**

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USE LEHIGH EARLY STRENGTH CEMENT !

INTERNATIONAL BUSINESS MACHINES
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In the job shown at right, the use of Lehigh Early Strength in 3 upper floors saved (1) the purchase of 13,000 sq. ft. of plywood panel forms; (2) 5 days construction time on each floor; (3) 5 days heat protection on each floor during cold weather.

Faced with cold weather and slow-down of construction on this bridge, the contractor used Lehigh Early Strength. The result was quicker completion plus a saving on form costs through prompt removal and re-use.

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ROADS (Contracts Awarded, Cont'd.)

Ia., Harlan—Shelby Co., gravel surfac
roads, to L. J. Peter Constr. Co., 208 6 Av
Des Moines, **$30,518.** Bids 7/24. J.
Camery, co engr.

Kentucky—Dpt. Hys., Frankfort, impr
29.911 mi. Clay-Leslie Counties, to Landr
& Teegarden, Columbus, Ind., **$251,546.** B
7/28. CD 8/1—ENR 8/3 under LB.

Minnesota—State Hy. Dpt., St. Pa
imprv. 6.5 mi. S.P. 2611-02, 2609-06 a
2609-07 to Strom Constr. Co., Moorhea
$80,575***8.3 mi. S. P. 5610-02 and 5609-
to C. L. Nelson Co., Brainerd, and R.
Jones, Deerwood, **$67,529*****5.1 mi. S.
1107-06 and 1104-09, to Fielding & Sheple
1258 Bohn St., St. Paul, **$52,020.** Gra
total, **$200,124.** Bids 8/4. CD 7/19—EN
7/27.

†**N. Y., Sampson**—Yards & Docks, Na
Dpt., 18 St. and Constitution Ave. N.W
Wash 25, D. C., maintenance and repair
roads, walks, drainage, Naval Training St
tion, NOY 10646, to Potter-DeWitt Cor
Pavilion, **$142,893.**

North Carolina — State Hy. & P. W
Comn., Raleigh, sand asphalt surfacing
mi. Betterment Sect. 2-6-17-108, Craven C
to West Constr. Co. of North Carolina, In
Kinston, **$61,480.** Est. $50,000-$75,000. B
8/15.

†**Ore., Astoria**—Yards & Docks, Navy D
18 St. and Constitution Ave. N.W., Wash.
D. C., finished road surfacing, Naval H
pital, NOY 10390, to Warren Northwest, In
P. O. Box 5072, Portland, Zone 13, **$36,4**

Tex., Dallas—City, c/o E. Goforth, se
paving Clarendon Dr., to Texas Bitulit
Co., 111 W. Commerce St., **$57,265.**

Tex., Galveston—U. S. Eng., 25 St.
Avenue F, Galveston, road imprv., gradi
shell base, asphalt top, etc., to Consolida
Contractors, Edna. **$25,000.**

Tex., Hearne—City, asphalt topping
streets, to D & H Constr. Co., Joe Field B
Dallas, approx. **$60,000.**

Washington—State Hy. Dpt., Olym
access road, Oak Harbor, Island Co.,
Northwest Constr. Co., 3950 6 Ave., N.
Seattle, **$104,411.** Bids 8/1.

Ontario—Dpt. Hys., Queens Park, Toro
4 mi. hy., 100 ft. wide, 30 ft. crown, 20
shoulders, to Creighton Mines, Copper C
to Angus & Taylor, Ltd., 24 Fraser St., No
Bay. **$100,000.**

Que., Joliette—Municipality, paving
eral streets, day labor, **$30,000.** H. E. Li
City Hall, engr.

Que., Pike River—Municipality, asph
roads, day labor, **$25,000.** Dpt. Roads, Q
bec City, engrs.

EARTHWORK, WATERWAYS

†**Conn., Bridgeport**—City, J. McLevy, m
or, City Hall, making plans dredging Pow
house Creek channel to depth of 12 ft. be
low water mark, 50 ft. wide, 1,000 ft. lo
FWA.

†**Kansas**—U. S. Eng., 416 Wright Bld
Tulsa, 2, Okla., 29,000 cu.yd. earth fill, e
levee repairs, Sol. No. 34-066-45-5, Neo
Co. Over $25,000.

La., Colfax—Nineteenth Louisiana L &
Dist., Colfax, earth levee, 6.92 mi. chan
clearing. Over $25,000.

Mont., Helena—Montana Power Co., H
ena, earthwork dam and spillway. $15,0

N. S., Dingwall—Dpt. Pub. Wks., Otta
Ont., dredging harbor. $86,500.

BIDS ASKED

Bids Asked September 2

†**Mich., Saginaw**—U. S. Eng., 700 Un
Guardian Bldg., Detroit, dredging in Sa
naw River Channel and Turning basin
depth of 16.5 ft. in channel and 15 ft.
turning basin, estimated alternate yarda
108,700 cu. yd. or 138,000 cu yd. incl. ov
depth dredging.

Bids Asked September 5

†**Mississippi**—U. S. Eng. Office, P. O.
60, Vicksburg, 18,000 cu. yd. earthw
along Big Sand Creek, Solic. No. 22-052-
13, Leflore and Carroll Counties.

†**Miss., Vicksburg**—U. S. Eng., P. O.
60, approx. 2,540 lin. ft. pile dikes in Ark
sas River at Fletcher Bend, center of w
being about 35.5 mi. above mouth of riv
Solic. No. 22-052-45-14.

Bids Asked September 6

†**Ore., Bend**—Bureau Reclamation, H.
Bashore, comr., Dpt. Interior, Bend, exc
backfill, overhaul, rock fills, dumped rip r
dry-rock paving, etc., for Unit. 3, C
Power Plant, Spec. 1079. Deschutes Proje
adv. ENR 8/24.

Bids Asked September 11

†**Tex., Austin**—At office Bureau Reclam
tion, S. O. Harper, ch. engr., Denver, Co
furnishing, del. f.o.b. cars at shipping p
or f.o.b. cars Austin, one 16 ton hoist
vator, incl, pump, motor, piping, electr
controls and wiring for Marshall Ford D
Colorado River Project, Spec. 1761-D.

LOW BIDDERS

California—State Div. Hys., Sacrame
Aug. 16, heavy stone riprap wire and
mattress and permeable pile jetties, 0.1
at Dyerville, Humboldt Co., from Schum
& Johnson, 1001 Lloyd Bldg., Seattle, Wa
$41,100. CD 7/28—ENR 8/3.

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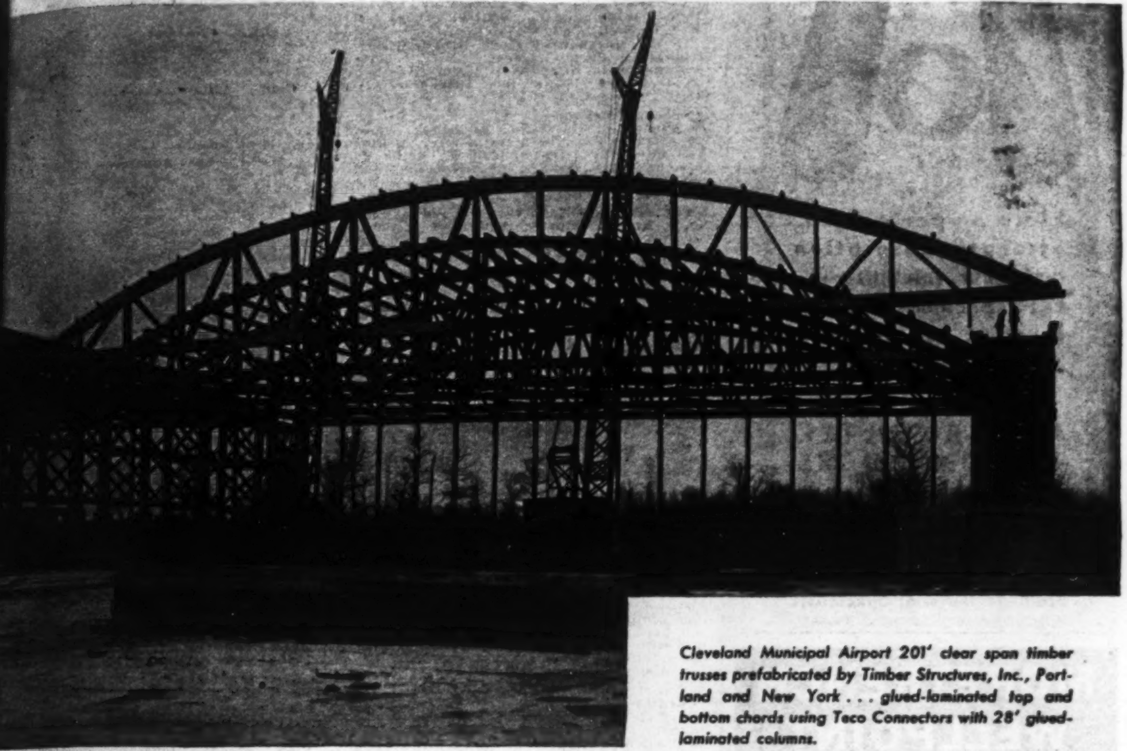

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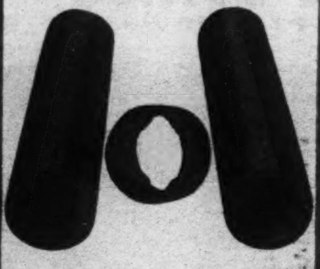

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EARTHWORK, WATERWAYS (Contracts Awarded)

†Louisiana—U. S. Eng., foot Prytania St., New Orleans, removing 7,400,000 cu. yd. from Mississippi River, at Kempe Bend, vicinity mile post 381 A.H.P., Sol. No. 16-046-45-1, to McWilliams Dredging Co., Canal Bank Bldg., New Orleans, 6.17c. per cu. yd. Est. $455,000. BA 8/3. CD 7/27.

†La., Alexandria—U. S. Eng., 300 Bway., Little Rock, Ark., erosion control, Solic. No. 03-050-45-8, Esler Field, to W. C. Richards, Athens, Tex., **$15,358.**

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, dredging, Cape Cod Canal, No. 19-022-45-NEG 5, to Arundel Corp., Fulton St., Brooklyn, N. Y., **$68,150.** Bids 8/10. CD 8/1—ENR 8/3.

N. C., Marshall—French Broad Electric Membership Corp., Marshall, 550 ft. concrete retaining wall, NC 46-G •Madison (REA), to R. H. Small, P. O. Box 3087 Charlotte, **$28,462.** Bids 8/10. CD 8/8.

★**†Tex., Anahuac**—U. S. Eng., 25 St. and Avenue F, Galveston, dredging, removing 41,166,000 cu.yd. materials for distance of 8 miles, to Atlantic, Gulf & Pacific Co., Citizens State Bank Bldg., Houston, 4.91c per cu.yd. or **$2,021,250.** Bids 6/8, awarded 8/13. CD 8/13—ENR 6/15 under LB.

Tex., Athens—Henderson Co. Levee Dist. No. 3, Athens, imprvs., restoration of levees, covering parts 15 mi. levee, to Gaylord Constr. Co., 303 Blodgett St., Houston, **$59,140.** O. N. Floyd, 1207 Texas Bank Bldg., Dallas, engr. CD 8/3—ENR 8/10.

†Tex., Corsicana—U. S. Eng., 231 W. Main St., Denison, levee repairs, 22,000 cu.yd. embankment, etc., Sol. 41-242-45-11, to McDonald Bros., 2011 Cross St., Dallas, **$15,000.** CD 8/9—ENR 8/17 under "Texas"

Tex., Pasadena—Southern Acid & Sulphur Co., Wallisville Rd., Houston, dredging, vicinity chemical plant, 1 mi. south of here, to Brown & Root, Box No. 3, Houston, **$41,000.** Dorr & Co., Inc., 570 Lexington Ave., New York, N. Y., engrs.

Wis., Ixonia—Town, R. 1, excavating, clearing drainage ditches, to W. W. Bruss, Maribel. **$14,071.** Bids 7/24.

LATIN AMERICA

★**Argentina, Buenos Aires**—Republic of Argentina, Buenos Aires, 2 main artery roads from Buenos Aires, by day labor, **$3,798,623.** General Administration of National Roadways, Buenos Aires, engr.; Plans buildings improving workshops on Argentina Northern Roadway, $1,500,000; General Administration of State Railways, Buenos Aires, engr.; Plans by National Committee of Historic Museums and Sites, Buenos Aires, National Pantheon, $1,000,000.

Mexico—Empacadora del Sureste, Palma, 45, office 305-F, Mexico, D.F., plans anchovy cannery. **$300,000.** Selecting site on Gulf of Mexico coast.

Mexico—National Rys. of Mexico, A. Ortiz, gen. mgr., E. Rodriguez Y Parra, eng. M. W., 19 Bolivar, Mexico City, D. F., laying rails state of Nuevo Leon, by own forces. **$400,000.**

Mexico, Aguacalientes — State of Aguacalientes, Aguacalientes, will construct dam for irrigation in Riego de Pabellon Dist., by own forces. **$2,800,000** Financial Aid from Federal Dept. Agriculture.

Mexico, Atenquique—Mexican Government, Scrita de La Econimia Nacional, Argentina, 12, Mexico, D. F., plans paper and cellulose factory.

Mexico, Merida—State of Yucatan, Governor Ernesto Nevelo Torres, Merida, taking bids school. $250,000.

Mexico, Mexico City—Conservas Alimenticas Vegetales, 5 de Mayo 32, office 311, Mexico, D.F., plans fruit and vegetables dehydrating plant. $250,000.

Mexico, Mexico City—Impulsora de Cementos, I. la Catolica, 33, Office 512, Mexico, D.F., plans grey portland cement factory. $350,000.

Mexico, Mexico City—Juan J. March, S. de R. L. 5 de Mayo, 32, desp. 311, Mexico, D. F., plans honey processing factory. $100,000.

Mexico, Tacubaya—Federal District, Rojo Gomez, mayor, in cooperation with Federal Health Dpt., Dr. Gustavo Baz, secy., Mexico City, takes bids late in 1944, constructing hospital. $450,000.

Mexico, Tepic—State of Nayarit, Governor C. Francisco, Garcia Montero, Tepic, will construct roads, highways, repairs by own forces. **$125,000.**

Mexico, Tlatilco—Federal District, Lic. Rojo Gomez, mayor, Mexico City, takes bids in September for construction of school. $200,000.

Mexico, Valle de Bravo—City of Valley de Bravo, Governor Isidro Tabela, Toluco, takes bids within 30 days, school, gymnasium, etc. $150,000. State will assist in financing.

Mexico, Vera Cruz—Mexican Government, Scrita de la Marina, Mexico, D. F., plans school for merchant marine. **$400,000.**

Mexico, Vera Cruz—Industrial de Ensenadn, Arnulfo Paredes, pres., Ensenada, B. California, Mexico, plans sea food packing plant and fishing base. $350,000.

PUBLIC BUILDINGS

PROPOSED WORK

†Ala., Birmingham—Public Housing Auth NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, 3, Ga., community bldg. addn. Ala. 1-292-F. $19,71 FWA.

★**†Ariz., Phoenix**—St. Monica's Hospita and Health Center, Phoenix, hospita Ariz. 2-134-F (Revised). $648,500. FWA.

†Calif., Bellflower—Bellflower School Dis of Los Angeles Co., school, Calif. 4-411-F $215,000. FWA.

†Calif., Clearwater—Clearwater Scho Dist. of Los Angeles Co., Grove Ave. Scho addn., 8 room classroom bldg., Cali 4-616-F. $98,100. FWA.

Calif., Lakewood Village — Lakewo School Dist., 5021 Centralia Ave., plans b Kistner & Wright, 412 Architects Bldg., L Angeles, frame, stucco addn. Lakewood Junior High School. $200,000.

★**†Calif., Los Angeles**—Queen of Ange Hospital, 8 story, hospital addn., Calif. 4-626-N. $607,493 FWA. Barker & Ott, 6 S. La Brea Ave., archts. CD 5/25—EN 6/8.

†Calif., Hayward—Pub. Bldgs. Admn. 2223 Fulton St., Berkeley, plans by Dragon Schmidts, 2068 Allston Way, Berkeley, story, rein.-con. detached Hayward Uni High School addn., Calif. 4-637-F. $122,2 FWA. CD 8/18.

†Calif., San Lorenzo—Pub. Bldgs. Adm 2223 Fulton St., Berkeley, Zone 1, plans b Dragon & Schmidts, 2068 Allston Wa Berkeley, Unit 1, 7 classroom and Unit 2 classroom school bldgs., Calif. 4-640-F $224,000. FWA. CD 8/18.

†Conn., Bridgeport—Pub. Housing Auth NHA, 24 School St., Boston, 8, Mass., grading, site imprvs., War Housing Huntingt Rd., Conn. 6053. Lindsay & Johnson, 21 State St., archts.

†Conn., Bridgeport—Pub. Housing Auth NHA, 24 School St., Boston, 8, Mass., sewag drainage work, Lincoln Terrace War Housing, Park Ave. Lindsay & Johnson, 211 Sta St., archts.

†Conn., Bridgeport—Pub. Housing Auth. NHA, 24 School St., Boston, 8 Mass., makin plans grading, site imprvs., Brady Housing Success Park, Conn. 6052. Lindsay & Johnson, 211 State St., archts.

†Conn., Stratford—Pub. Housing Auth NHA, 24 School St., Boston, 8, Mass., makin plans grading, drainage, site imprvs., Conn 6061. Lindsay & Johnson, 211 State St. Bridgeport, archts. CD 5/19—ENR 5/25.

★**D. C., Wash.** — District Comrs., Distric Bldg., temporary dormitory bldg. a Langston Stadium. $500,000.

†Fla., Jacksonville—Bd. Public Instructi of Duval Co., plans 5 school addns., at Riverview, Thomas Jefferson Elementary-Junior High, Westconnett Junior High, Duncun U. Fletcher Junior-Senior High School, and a North Shore Elementary-Junior High Schools, Fla. 8-304-N. $274,820. FWA.

†Fla., Key West—Public Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, 3, Ga., child care bldg., Fla. 8-322-F. $44,000. FWA.

†Ga., Atlanta—Crawford W. Long Memorial Hospital, 35 Linden Ave., N.E., acquiring, renovating, 3 story, bsmnt., apartment Ga. 9-296-N. $72,500. FWA.

†Ill., Peoria—Sisters of Third Order of St. Francis, Peoria, 3 story, part bsmnt. nurses home addn., St. Francis Hospital, 530 N. Glen Oak St., Ill. 11-200-N. $190,550. FWA.

★**†Ind., Indianapolis**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., 25, D. C., preparing plans 2 story, bsmnt., brick, rein.-con., veterans hospital addn., Cold Spring Rd., $750,000 to $1,000,000

†Md., Baltimore—U. S. Eng., Standard Oi Bldg., Baltimore, plans by Palmer & Lamdin, 1020 St. Paul St., film storage vaults $79,500.

†Md., Baltimore—South Baltimore General Hospital, Inc., 1213 Light St., 3 story, bsmnt., penthouse addn. nurses home, Md. 18-224-N. $67,500. FWA. CD 1/10—ENR 1/13.

†Mass., Fall River—Truesdale Hospital Inc., 3rd story addn. nurses home, Mass. 19-191-N. $30,500. FWA.

†Mich., Ecorse (br. Detroit)—School Dist. 9, Ecorse Twp., 2nd story addn. to south wing, of Lapham School, Mich. 20-368-N. Allen Park. $62,660. FWA.

★**†Neb., Grand Island**—U. S. Eng., 170 Jackson St., Omaha, addnl. bldgs. a Cornhusker Ordnance plant, incl. bldg. construction, loading lines. Approx. $3,000,00

†Nev., Las Vegas—City, 1 story, fire station and 1 story sub-fire station, Nev. 24-130-N. $64,880. FWA.

†N. Y., Amherst—Common School Dis No. 14, Town of Amherst, Erie Co., 2n floor school addn., N.Y. 30-283-N. $60,00 FWA.

†Okla., Oklahoma City—Bd. Regents o University of Oklahoma, 800 NE. 13th St. nurses home addn., etc. Okla. 24-199-N $73,500. FWA.

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†Pa., Chester—School Dist., plans classroom addn. Clayton School, Pa. 344-N. $129,160; 8 classroom addn. Bo T. Washington School, Pa. 36-350- $108,286. FWA.

†Tex., Fort Ringgold—Pub. Bldgs. Adm 18 and F Sts. N.W., Wash., 25, D. C., c verting Ft. Ringgold Army Post into tub culosis hospital. Over $150,000.

†Tex., Orange—Orange Independent Sch Dist., two prefabricated schools, Senior H School, 4 prefabricated units, Junior H School, Tex. 41-687-C. $210,000. FW CD 6/30—ENR 7/6.

†Tex., Pasadena—Bd. Educ., plans by He rick & Lindsley, Inc., Southern Standa Bank Bldg., Houston, school, Tex. 41-6 $110,000-$150,000. FWA.

★**†Va., Norfolk**—Yards & Docks, Na Dpt., 18 St. and Constitution Ave. N.W Wash., 25, D.C., barracks, warehouses, et $2,900,000. Giffels & Vallet, Inc., Ma Creek Rd. at Boush Creek, engr. CD 6/

★**†Wis., Merrimac**—U. S. Eng., 408 Fede Bldg., Milwaukee, powder plant ad $14,500,000 allotted for construction a equipment. Hercules Powder Co., 908 M kot St. Wilmington, Del. operator. Ma & Hanger Co., 500 5 Ave., New York, N. engrs. and archts.

Alta., Edmonton—Dpt. Pub. Wks., Otta Ont., plans by C. D. Sutherland, c/o own postal terminal. Over $150,000.

★**Alta., Edmonton**—University of Edm ton, Dr. Robt. Newton, pres., library bl $500,000; east wing to medical bldg., $90 000; dental school $600,000.

★**B. C., Victoria**—Dpt. P. Wks., Otta Ont., plans by C. D. Sutherland, arc c/o owner, 250 bed hospital, adjoining Ju lee Hospital. $750,000. CD 8/7—ENR 8/1

★**Ont., Ottawa**—Dpt. Mines & Resour Ottawa, Ont., plans by C. D. Sutherla Dpt. Pub. Wks., Ottawa, Ont., hydroge tion plant in Fuel Research Laborator $870,000.

★**Ont., Toronto**—Wartime Housing, L 55 York St., 350 houses. $1,500,000.

BIDS ASKED

Bids Asked August 28

†Pa., Williamsport—Lycoming Div. A tion Mfg. Corp., Williamsport, maso structural steel laboratory addn. $250, Defense Plant Corp. will finance.

†Va., Newport News—City, J. C. Bigg mgr., addn. Dpt. Public Safety Bldg., 44-129. $150,800. FWA. Plans deposit Williams, Coile & Pipino, 408 Melson Bl archt.

Bids Asked August 29

†N. J., Winfield—Federal Works Age 101 Park Ave., New York, 17, N. Y., sc addn., N.J. 28-132. Extended date. Zi & Childs, 921 Bergen Ave., Jersey C archts. CD 6/8—ENR 8/10.

Bids Asked August 30

†Ill., Chicago—Schmidt, Garden & E son, archts., 104 N. Michigan Ave., 2 st 107x110 ft., brick, rein.-con. nurses trai school, Ill. 11-268-N, for Provident Hos and Training School, 426 E. 51 St. $140, FWA.

Bids Asked August 31

†N. C., Statesville—At H. F. Long Hosp Statesville, nurses home addn., NC 31- $17,000. FWA. Plans deposit $10. Cha Benton & Sons, 509 Natl. Bank Bldg., Wil archts.

Bids Asked About September 1

†N. J., Bridgeton—Federal Works Ag 101 Park. Ave., New York, 17, N. Y. 34x70 ft. wing addns. school bldg., Seab Farms, N. J., 28-179. $70,000. J. N. He 501 Cooper St., Camden, archt.

N. C., Goldsboro—State Hospital of Go boro, R. M. Purser, bus. mgr., abat Plans deposit $10. Atwood & Weeks, 504 Snow Bldg., Durham, archts.

†N. C., Kinston—Eastern Carolina Hos Corp., Kinston, nurses home for Mem General Hospital, NC 31-295. $67,300. F Plans deposit $15. J. J. Rowland, 10 Queen St., archt. CD 8/9—ENR 8/17.

†Va., Richmond—At office Dr. W. T. ger, pres. Medical College of Virginia pital, 1207 E. Marshall St., altering por of basmt. and 1st floor of St. Philip pital for Negroes, Va. 44-397. $6 FWA. Plans deposit $10. Bakervill Son, 2203 Central Bank Bldg., archts. 7/13—ENR 7/20.

★**†Pa., Lebanon**—Veterans Admin., mont Ave., between H and I Sts. N Wash., 25, D. C., hospital bldgs. $2,00 CD 6/9—ENR 6/17.

★**Pa., Norristown**—Dpt. Welfare, Property & Supplies, Capitol Bldg., risburg, hospital bldg. addn. $840,000. Ho Lewis & Shay, Packard Bldg., Phila., ar CD 8/14—ENR 8/17.

Bids Asked September 5

†Conn., Groton—Bd. Educ., Town 1 story, 50 x 90 ft., school, Fort Hill C 6-229-F $30,000. FWA. L. F. Caproni, Chapel St., New Haven, archt. Exte date. CD 7/27—ENR 8/2.

†Mich., Wayne—Pub. Bldgs. Admin. and F Cts. N.W., Wash., 25, D. C., 1 recreation bldg., Mich. 20-325. FWA 7/28—ENR 8/3.

LIC BUILDINGS (Bids Asked).

Bids Asked September 6

lif., Vallejo—Federal Works Agency, hattuck Sq., Berkeley, Zone 4, nursery l bldgs., 2 at Flosden School, 1 ea. at e and Carquinez Schools, Calif. 4-632-F. 75. FWA. CD 7/25—ENR 7/27.

Bids Asked September 7

d., Baltimore—Franklin Square Hospi- 110 N. Calhoun St., constructing addns. s home, Md. 18-199, $162,000. FWA. Emmart, Fidelity Bldg., archt. Kubitz enig, Emerson Tower, structural engr., y Adams, Inc., Calvert Bldg., mechani- ngr. CD 8/16—ENR 6/22.

alif., San Francisco—Federal Works cy, 15 Shattuck Sq., Berkeley, Zone 5, ry school at San Francisco State Col- Calif. 4-578-F. $22,700. FWA. Plans it $15. Bernardi, Wickenden, Lang- & Funk, 402 Jackson St., archts. CD ENR 8/10.

Bids Asked September 8

alif., Santa Rosa—Bd. Supervs. Sonoma County Clerk's Office, County Court , nurses home. $150,000. FWA Plans it $25. D. D. Stone and L. B. Mulloy, ciate, 381 Bush St., San Francisco, s.

, Dayton—Pub. Bldgs. Admin., 18 and s N.W., Wash., 25 D. C., temporary s home addn., Miami Valley Hospital, 33-284-F. FWA. Schenck, Williams, 3 Natl. Bank Bldg., archts. CD 8/15— 8/17.

C., Esquimalt — Minister Pub. Wks., ament Bldgs., Victoria, hospital. $170,- H. Whittaker, Parliament Bldg., Vic- , archt. CD 3/28—ENR 3/2.

Bids Asked September 12

ex., Corpus Christi—Corpus Christi Ind. ol Dist., 3 schools. Tex. 41-685-N. $150,- FWA. Brock & Anderson, Jones Bldg., ts. CD 7/21—ENR 7/27.

Bids Asked September 15

alif., San Diego—Pub. Bldgs. Admin., nd F Sts. N.W., Wash., 25, D. C., Fron- School Bldg., Calif. 4-584-1, Midway ol, Calif. 4-584-2, Barnard School, Calif. 4-1. Extended date. FWA. F. L. Hope, 1008 San Diego Trust & Savings Bldg., t. CD 8/7—ENR 8/10.

Bids Asked September 18

Utah, Ogden—Order of St. Benedict, St. Joseph, Minn., at Ogden, 3 story, 31x308 brick, rein.-con. hospital. Utah, 42-178-N. A. J. K. Monroe, 2150 Curtis St., Denver, , archt. CD 5/5—ENR 5/11.

Bids Asked September 21

Utah, Ogden—Order of St. Benedict, St. Joseph, Minn., at hospital, Ogden, 2 y, 69x272 ft., brick, rein.-con. nurses e, Utah 42-178-N. FWA. J. K. Munroe, Curtis St., Denver, Colo., archt. CD —ENR 5/11.

Bids Asked

Conn., Bridgeport—City, G. Wellington, Bd. Fire Comrs., firehouse, Sylvan Ave. Old Town Rd., Conn. 6-221, $12,100. A. A. N. Pokras, 436 Salem St., archt. Weiman, 3018 Main St., engr. CD 4/21 NR 4/28.

Conn., Bridgeport—City, G. Wellington, Bd. Fire Comrs., firehouse, Broad- ge Ave. and Huntington Turnpike, Conn. 6. $11,750 FWA. gr. T. Vece, 1241 n St., archt. J. A. Weiman, 3018 Main engr. CD 11/19—ENR 11/25.

W BIDDERS

Calif., Herlong—U. S. Eng., 1209 8 St., ramento, Zone 8, fire walls, concrete s in warehouses, railroad crossover at ra Ordnance Depot, Honeylake Valley, 341, from L. F. Dow Co., 8465 Melrose , Los Angeles, $270,599.

Calif., Hunters Point—Pub. Housing h., NHA, Phelan Bldg., San Francisco, 17, site development work necessary 500 portable dwelling units, South Basin Housing site, Calif. 4866, for Housing h. of City and County of San Francisco, Chas. L. Harney, 625 Market St., and cDonald & Kahn, Inc., 200 Financial Cen- Bldg., San Francisco, $209,000. CD 8/11 NR 8/17.

, Chicago—Pub. Housing Auth., NHA, N. Wells St., July 25, 1 and 2 story, k community bldg., vicinity 130 and Ellis from B. W. Handler Co., 12 E. 13th St., ,700. CD 7/20—ENR 5/18.

a., Chester—Pub. Bldgs. Admin., 18 and s. N.W., Wash., 25, D. C., Aug. 16, com- ity and recreation bldg., Pa. 36-199 from Adelhardt Constr. Co., 329 E. 47 St., New k 17, N. Y., $211,859. CD 7/28—ENR 8/3.

Wash., Seattle—School Dist. No. , Aug. 10 nursery addns. to schools, Wash., 07-F, from D. Brazier, 2816 12 Ave., N., ,000. FWA. CD 7/6—ENR 7/13.

TRACTS AWARDED

Calif., Burbank—Lockheed Aircraft Corp. Hollywood Way, 2 story, bsmnt., 110 16 ft., frame, stucco, office and store- bldg. No. 333, to J. O. Oltmans & Son, E. 1st St., Los Angeles, $95,000. Defense t Corp. will finance. D. B. Parkinson, S. Spring St., Los Angeles, archt.

Calif., Ream Field (br. San Diego)— AVIATION BLDGS., etc.—Yards & Docks, y Dpt., 18 St. and Constitution Ave. , Wash., 25, D. C., addnl. aviation , etc., Spec. 14455, NOY 9995, to s I. Barnes Constr. Co., 1119 Montana Santa Monica, $621,220. CD 8/8.

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WHAT *kind* of pipe do you use? Well . . . let's see: If it's a long water line over rough country, or a dredge or sand and gravel line, the first kind of pipe that comes to your mind —and *should*—is Taylor Spiral.

But suppose it's just the general run of everyday moderate or low pressure piping: In too many cases the kind of pipe that comes to mind—and *shouldn't*—is ordinary Standard Thickness pipe. In other words the pipe for these run-of-mine jobs is simply bought by *size.*

If you buy pipe by rating—by ability to handle the job at hand—you will find that Taylor Spiral Pipe can take care of a large percentage of the general run of piping services. It can do this because its spiral welded construction gives it the strength of Standard Thickness pipe of far heavier wall thickness.

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PUBLIC BUILDINGS (Contracts Awarded, Cont'd.)

†**Calif., Treasure Island**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., enlisted personnel baggage storage, Receiving Ship, Spec. 14479, NOY 10024, to Cahill Bros., 206 Sansome St., San Francisco, $71,873. Bids asked 8/1. CD 7/24.

†**Ill., Joliet**—Silver Cross Hospital, Hickory Mills, 2 story, brick, concrete nurses' home, Ill. 11-284, to Robert Regan Co., 228 N. La Salle St., Chicago, $160,000. FWA. Bids 8/10. CD 8/8—ENR 4/13.

★†**N. Y., Scotia**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., 4 addnl. storehouses, Naval Supply Depot, NOY 9433, to John A. Johnson Contg. Corp., 270 41 St., Brooklyn, Zone 32, $1,465,857. Bids 8/1. CD 8/3 under LB.

★†**Tex., Amarillo**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., 25, D. C., constructing addn., Cactus Ordnance Works, to A. J. McKenzie Constr. Co., Transit Tower Bldg., San Antonio, approx. $5,750,000. Pantex Certain-teed Ordnance Plant, Dumas, operators.

†**Tex., Fort Worth**—U. S. Eng., Grants Lane, Fort Worth, outside utilities, waterworks, sewerage, gas lines, at bomber plant to O. J. Parrott, 1505 Tower Petroleum Bldg., Dallas, $47,162. Consolidated-Vultee Aircraft Corp., Grants Lane, Fort Worth, operator.

★†**Va., Arlington**—Federal Works Agency, 18 and F Sts. N.W., Wash., 25, D. C., 3 story, 80x401 ft. wing to Navy Annex Bldg., to Graham Bros., Mutual Bldg., Richmond. Est. $529,000.

†**Wash., Fort Lewis**—U. S. Eng., 800 2 Ave., Seattle, Zone 4, box factory at Mount Rainier Ordnance Depot, to Macdonald Bldg. Co., 1517 S. Tacoma Way, Tacoma. $54,877.

COMMERCIAL BUILDINGS

PROPOSED WORK

La., New Orleans—International House, New Orleans, soon lets contract remodeling Louisiana Bldg. Herbert A. Benson, Carondelet Bldg., archt. CD 7/26.

Minn., Fergus Falls—Wright Memorial Hospital, Fergus Falls, preliminary plans by Magney, Tusler & Setter, 202 Foshay Tower, Minneapolis, remodeling present hospital, constructing 3 story, bsmnt., fireproof addn. $150,000.

★**N. J., Springfield**—Elmer N. Rinhart & Co., 10 Bank St., Summit, colonial type garden apartment, brick, 160 apartments, Morris and Short Hills Aves. $500,000.

S. D., Huron—St. Johns Memorial Hospital, Rev. J. J. O'Neil, St. Martins Church, Huron, plans by Magney, Tusler & Setter, 202 Foshay Tower, Minneapolis, 5 story, fireproof hospital. $414,000.

Tex., Beaumont—H. A. Perlstein, Perlstein Bldg., reconstructing 4 and 6 story, brick, stone, mercantile and office bldg. $150.000.

Tex., Raymondville—W. L. Rocky, Raymondville, soon lets contract sixty 1 story, structural clay tile, stucco residences. $240,000.

Tex., Weslaco—Owner, c/o Jno. Mothershed, mgr., Weslaco Chamber of Commerce, 25 or more 5 and 6 room dwellings and facilities. $150,000.

Newfoundland, St. Johns—Salvation Army, Bank of Nova Scotia Bldg., girls' home and home for aged. $150,000.

Ont., Hamilton—L. Smith, 42 S. James St., 3 story, brick apartment, concrete fdn., W. Main St. $150,000.

Que., Verdun—Verdun General Hospital Bd., Dr. E. Thibault, pres., 4070 Blvd., La Salle, plans by S. Brais, 7084 St. Denis St., Montreal, addnl. wing. $350,000-$400,000.

BIDS ASKED

Pa., Enola—Pennsylvania R.R., J. L. Gressitt, ch. engr., Broad St. Sta. Bldg., Phila., 2 story dormitory, Columbia Ave. and Enola Rd. $240,000.

Pa., Harrisburg—Pennsylvania R.R., J. L. Gressitt, ch. engr., Broad St. Sta. Bldg., Phila., 2 story dormitory, 7 and Reily Sts. $100,000; converting dwellings into dormitory bldg., 437-43 Market St., $107,000.

CONTRACTS AWARDED

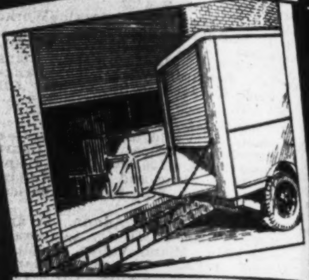
Utah, Salt Lake City—American Land Co., 3030 Exposition Blvd., Los Angeles, Calif., 107 brick dwellings, southeastern section, to Lembke Constr. Co., 321 N. 3 St., Albuquerque, N. M., approx. $400,000.

N. B., Sackville—Mount Allison University, G. T. Trueman, pres., 4 story, bsmnt., reincon., stone, men's residences, to Ambrose Wheeler, Ltd., 21 Wesley St., Moncton, Est. $250,000. CD 5/19—ENR 5/25.

N. S., Halifax—Laurence Construction Co., 15 Cunard St., housing. Owner builds. $150,000.

Que., Montreal—Isabella Realties Ltd., 4530 Circle Rd., 20 flat dwellings, to Economic Constr. Co., Ltd., 5402 Hutchinson St., Est. $150,000.

ANOTHER PAGE FROM KINNEAR'S BOOK OF ADVANTAGES



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NDUSTRIAL BUILDINGS

ED WORK

Birmingham — PLANT — Cleveland
Co., 2331 5 Ave., S., bids soon plant
$40,000. D. O. Whilldin, Empire Bldg.,

Bakersfield — PLANT — Haberfelde
Works, Union Ave. and 24 St., recon-
ting plant. Over $200,000.

Clovis—MILL—Clovis Feed Mill, 5
Fulton Sts., reconstructing mill. Over

Denver—PLANT—Chas. MacKenzie
3353 Walnut St., plans by H. W. J.
oke, Tabor Bldg., remodelling, 1 story,
125 ft. and 1 story, 50x125 ft. store and
addn. Over $50,000.

Bridgeport — PLANT — Whipple &
ls Co., Lewis L. Gross, pres., 934 South
rebuilding plant. Over $40,000.

New Haven—FACTORY—A. C.
rt Co., 319 Peck St., bids soon 3 story,
factory, Peck St. $65,000. Leo F.
rni, 1221 Chapel St., engr.

Baltimore—PLANT—Tomke Alumin-
Co., c/o Kubitz & Koenig, Consult. Engrs.,
Tower, soon lets contract, 1 story,
260 ft., steel, masonry manufacturing
$75,000.

Sparrows Point (br. Baltimore)—
ORAGE—Bethlehem Steel Co., Sparrows
soon lets contract 2 story, brick, steel
ld storage bldg. addn.

Detroit Lakes — PLANT — Lakes
ry Cooperative, Wm. Thompson, Frazee,
bids soon rein.-con., brick, milk de-
rating plant. $50,000. Cost incl. equip.
5,000. S. M. Houkom, 716 South 7 St.,
go, N. D., archt. CD 7/19—ENR 7/27.

J., Kearny (br. Arlington)—PLANT—
goleum-Nairn Co., 195 Belgrove Dr.,
s by Albert Kahn Associated Architects
Engineers Inc., 345 New Center Bldg.,
roit, 2, Mich., linoleum manufacturing
$50,000.

J., Westfield—WAREHOUSE—Henry
Townsend Storage Co., 241 North Ave.,
s by G. S. Kingsley, 101 Park Ave.,
York, N. Y., 3 story, brick, concrete
k storage warehouse. $40,000.

Y., Schenectady—SHOP BLDGS.—Amer-
Locomotive Co., N. Jay St., soon lets
tract shop bldg. addns.

C., Holly Ridge—MILL—Corporation
med, V. O. Radicky, Mount Airy, woolen
Over $40,000.

Hamilton—WAREHOUSE—Prack &
ck, archts., Pigott Bldg., soon let con-
t 1 and 2 story, 130x240 ft., steel, brick
plate warehouse addn., for Dominion
ndaries & Steel, Ltd., Depew St. $75,000.
6/8—ENR 6/10.

kla., Alva—GRAIN ELEVATOR—Public
v. Co., Alva, 1 m. bu. cap. grain elevator.
0,000.

kla., Edmond—PLANT—Peppers Gaso-
Co., Enid, natural gasoline plant, $300,-

kla., Ponca City—PLANT—Continental
Co., Ponca City, rebuilding 100-octane
ation gasoline plant. Over $40,000.

enn., Nashville—MILL—Chas. Buchanan
51 and Alabama Aves., rebuilding mill.
,000.

Tex., Dallas — TURBO GENERATOR
PLANT—Dallas Power & Light Co.,
llas Power & Light Bldg., Dallas, ex-
nding Mountain Creek turbo-generator
nt, 30,000 kw addn. $2,750,000. CD
1/41—ENR 8/7/41.

ex., Deweyville—MILL—Newton County
mber Co., Orange and Deweyville, recon-
ucting lumber mill. $75,000.

ex., Donna—WAREHOUSE—Knapp Sher-
Co., 331 S. 8 St., 1 story, 60x236 ft. brick,
-con., tile warehouse. Over $40,000.

ex., Edinburg—PLANT—Edinburg Citrus
n., Edinburg, 1 story, brick, rein.-con.
rus packing plant unit, incl. sterilization
coloring rooms. Over $40,000.

ex., Harlingen—TERMINAL—Arroyo Col-
do Navigation Dist., c/o C. H. Purdy, chn.,
Grande Bldg., terminal and dock facili-
$300,000.

ex., Houston—PLANT—Gaylord Contain-
Corp., 6037 Esperson St., 1 and 2 story,
173 ft., brick, hollow tile, container man-
cturing plant, $100,000.

ex., McAllen—FACTORY—R. B. Suttle,
NW 16 St., 1 story, brick, tile factory.
,000.

Wash., Seattle—LAUNDRY—Metropolitan
ndries, 224 Pontius Ave., plans by The
tin Co., Dexter Horton Bldg., Zone 4,
tory brick laundry addn. $65,000.

Wash., Seattle — WAREHOUSE — A. M.
tle Co., Smith Tower, Zone 4, warehouse,
Marginal Way and Spokane St. $180,000.

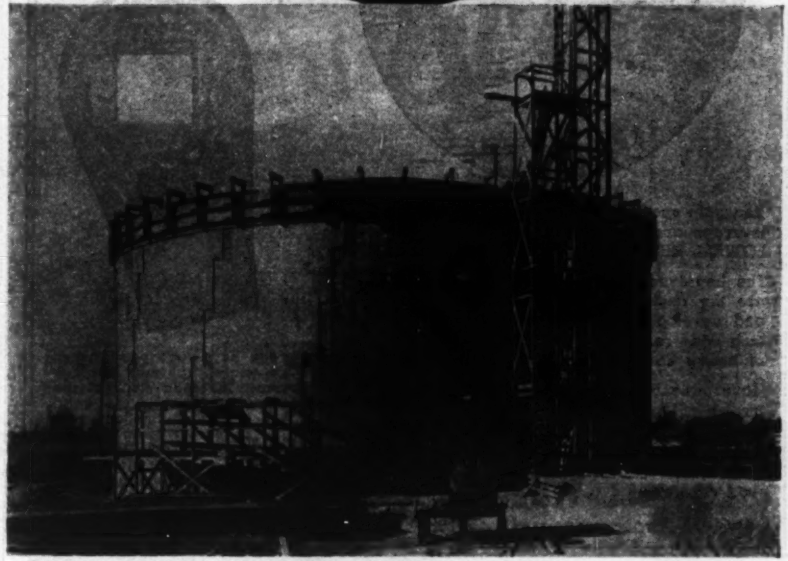
lta., Magrath—PLANT—Eddington Can-
g Co., Ltd., Magrath, plant. $40,000.

British Columbia — PLANT — Gypsum
Lime & Alabastine Canada, Ltd., 509
hard St., Vancouver, rebuilding plant.
struction $100,000, total cost $500,000.

C., Alberni—PLANT—Alberni District
op Association, Alberni, cold storage
nt. $50,000.

PRE-STRESSED CONCRETE

It Makes Stronger Tanks



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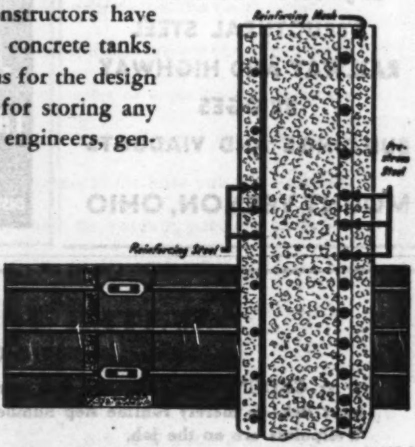

Photographs shows a Pre-Stressed Concrete Tank recently constructed by Nicholson. The drawing gives some of the details. The construction was also by the Sliding Form Method.

9-NC-1

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INDUSTRIAL BUILDINGS (Proposed Wo
Cont'd.)

B. C., New Westminster—PLANT—Alas Pine Co., Ltd., 4 Ave. and 15 St., wood d tillation plant.

B. C., Vancouver—PLANT—United Fi erman's Co-operative Society, 305 Railw St., plant. $47,000.

N. B., Fredericton—PLANTS—Provinci Govt., Fredericton, plans by Dpt. Pub. W cold storage also processing plant. $150,0

N. B., Loggieville—SAWMILL, etc.—A R. Loggie Co. Ltd., Loggieville, sawmill a box factory. $50,000.

N. B., Saint John—PLANT—Elmac C Inc., 36 Royal Bank Bldg., remodeling pla bldgs. $40,000.

Newfoundland, St. Johns — PLANT — I perial Oil Ltd., St. Johns, reconstructi plant. $40,000. Engineer c/o A. T. Robli Imperial Oil Ltd., St. Johns.

North West Territory, Yellowknife—DIA MOND DRILLING—Yellorex Gold Mine Ltd., c/o G. A. Gardner, 217 Bay St., T ronto, Ont., diamond drilling, mining stru tures, etc. $200,000. B. S. W. Buffam, Yonge St., Toronto, Ont., engr.

North West Territory, Yellowknife — MINING DEVELOPMENT—Bear Explora tion & Radium Co. Ltd., 80 W. King S Toronto, Ont., development mining bld $300,000.

Ont., Brampton—PLANT—Canadian Tam pax Corp., Ltd., 533 College St., Toront 75x200 ft. steel, rein.-con. plant. $65,00 James & Delamater, 621 Spadina Ave., Tor onto, engrs.

Ont., Cache Bay — PLANT — Cache Ba Veneer Co., Ltd., Cache Bay, woodworki plant. $40,000.

Ont., Kirkland Lake—DIAMOND DRILL ING—Olivet Gold Mines, Ltd., 67 Yonge St Toronto, diamond drilling. $40,000.

Ont., Midland — PLANT — New Proce Equipment Co. Ltd., c/o E. M. Shaw, Mid land, plant. $40,000.

Ont., Oakville — PLANT — Oakville Fruit Ltd., Oakville, plant for manufacturing an processing fruits, vegetables, etc. $40,000.

Ont., Porcupine—DIAMOND DRILLING— Rusk Porcupine Mines, Ltd., 67 Yonge St Toronto, diamond drilling, in Bristol Tw $50,000.

Ont., Prescott—FACTORY—Canada Pap Can & Tube Co., Ltd., Prescott, factory $50,000.

Ont., Renfrew—PLANT—Upper Ottaw Co-operative Poultry Products, Ltd., Renfrew, processing plant. $40,000.

Ont., Toronto — PLANT — Art Chemica Products Ltd., c/o Ross Hossack, 302 Ba St., plant. $40,000.

Ont., Toronto—MACHINE SHOP, etc.— Carlaw Radio Toolers Ltd., c/o Manton A Wilson, 302 Bay St., machine shop and meta working plant. $40,000.

Ont., Toronto—PLANT—The William S Merrell, c/o Richmond W. Hart, 350 Bay St. chemical and pharmaceutical mfg. plant $40,000.

Ont., Walkerville — PLANT — Walkervill Brewery Ltd., Walkerville, lager fermenti room, ale fermenting room, yeast rooms bottling shop cellar. $150,000.

Ont., Weston—STORAGE—E. I. Davidso archt., 36 Toronto St., Toronto, soon lets contract, 40x112 ft. wood, steel storage bldg. concrete fdn., for Canada Cycle & Motor Co. Dufferin St. $45,000.

Que., Belleterre—DIAMOND DRILLING— Blondor Quebec Mines Ltd., 330 Bay St. Toronto, Ont., diamond drilling. $75,000.

Que., Huntingdon—MILL—Canada Ta Ltd., Huntingdon, mill. $50,000.

Que., Huntingdon—PLANT—Popular Ru Ltd., Huntingdon, plant. $40,000.

Que., Iberville—PLANT—St. Johns Pape Box Co., Ltd., St. Johns, plant. $50,000.

Que., Louvicourt—DIAMOND DRILLING— Hera Cadillac Gold Mines, Ltd., c/o J. J Coglan, 80 Hogarth Ave., Toronto, Ont. diamond drilling. $40,000.

Que., Rouyn — DIAMOND DRILLING — Horne Fault Mines, Ltd., Duparquet, diamond drilling in Beauchartel Twp. $30,00

Sask., Moose Jaw — PLANT — Prairi Vegetable Oils Ltd., Moose Jaw, plant $40,000.

BIDS ASKED

Bids Asked August 28

N. Y., Ballston Spa—PLANT—America Hide & Leather Co., Inc., at office Kei & Holroyd, Consult. Engrs., 257 Bway., Tro 1 story, brick, concrete, steel, finishing bld No. 32. Plans deposit $25.

Bids Asked August 29

W. Va., Princeton—SHOP—Virginia Rail way Co., A. M. Traugott, ch. engr., Termina Bldg., Norfolk, railway shop bldg. $400,00 C. A. Neff, Western Union Bldg., Norfol archt.

Bids Asked August 31

Tex., San Antonio—GRAIN DRYER—Liberty Mills, 902 Morales St., 45x95 ft., rein.-co steel, grain dryer, 87 ft. high. CD 7/5—EN 7/13.

TRIAL BUILDINGS (Bids Asked, t'd.)

Ottawa—GARAGE—Canadian Na- Ry. B Wheelwright, ch. engr. Central 416 Union Station, Toronto. express King Edward Ave. $100,000.

Bids Asked

Everett (br. Boston)—FACTORY— Steel Products Co., 48 Auburn St., 1 story, 65x150 ft. brick, concrete, 1 St. $40,000. S. S. Eisenberg, 69 St., Boston, archt. CD 8/17 — ENR

BIDDERS

Fort Worth—PLANT—Hobbs Mfg. 609 N. Main St., Aug. 15, general con- approx. 290x200 ft. plant from P. O'B. gomery, 912 Akard St., Dallas, $167,300. 8/1—ENR 8/3.

TRACTS AWARDED

Stonington—STORAGE HOUSE— Fish & Transportation Co., Longo storage house and wharf, to Elliott & Inc., Crest Ave., East Providence, Est. $45,000.

Cumberland Mills—PLANT—S. D. Co., 102 Cumberland St., 6 story, soda recovery unit and 1 story, brick bldg., to Tredennick-Billings Co., High St., Boston, Mass. Over $40,000.

Minneapolis — WAREHOUSE—Gray Inc., 60 11 Ave., N.E., general contract story, 32x131 ft. and 1 story, 131x290 ft. house addn. to factory, to Adam Ku- 2200 NE Roosevelt St., $75,000-$100,000.

Minneapolis—MACHINE SHOP, etc. Mfg. Co., 406 6 Ave., S., general con- 1 story, 135x140 ft. concrete block, machine shop and office, 1308-20 South to W. A. South Co., 120 South 10 St. 000.

Winthrop — PLANT — Tri-County Cooperative, Leo Schafer, pres., Win- general contract 1 and 2 story, 87x140 brick, tile central milk dehydrating plant, G. E. Carlstrom Constr. Co., Mankato, 740. Rejected bids Aug. 3, above is ne- ated contract. CD 8/1—ENR 8/3.

St. Louis—WAREHOUSE—Comfort ting & Stationery Co., 210 South 7 St., 2, altering, imprv. 4 story, warehouse and Elm Sts. to J. B. Gutmann Constr. Wainwright Bldg., 7 and Chestnut Sts., J. Est. $50,000. M. Boulicault, Am- dor Bldg., 411 N. 7 St., Zone 1, archt.

J., Birmingham—PLANT—Permutit 330 West 42 St., New York, 18, N. Y., and 2 story, 100x141 ft., tile block mfg. to Wigton-Abbott Corp., 1225 South Plainfield, $40,000.

J., Elizabeth—PLANT—Linde Air ducts Co., 796 Frelinghuysen Ave., ark, and 2 story, brick, corrugated iron t, to Roth-Buermann Co., 319 Mt. Pleas- Ave., Newark, $50,000. Bids 8/7. CD —ENR 8/3.

J., Lodi—FACTORY—Bergen Wire Rope New St., 1 story, brick, concrete block tory addn., to Di-Carolis, Inc., 274 Union Hackensack, $45,000. W. G. Bartels, 272 St., Hackensack, archt.

Tex., Fort Worth—FACTORY—Erwin Man- cturing Co., Kings Hys., 1 story, 60x140 brick, tile, rein.-con. bag mfg. factory, Thos. S. Byrne, 1st Natl. Bank Bldg., 000. Lockwood & Andrews, Union Natl. k Bldg., Houston, archts.

Tex., Galveston—GARAGE REPAIR SHOP W. B. Benson, 1212 Sealy St., 1 story, 35 ft., brick, hollow tile garage repair to J. W. Zempter, 2115 Church St., 000. F. T. Stafford, 1931 Post Office,

Tex., Pasadena—PLANT—Southern Acid & Sulphur Co., 7621 Wallisville Rd., Hous- chemical plant, to United Engineers & structors, 7621 Wallisville Rd., Houston, 350,000. Dorr & Co., Inc., 570 Lexington New York, N. Y., engrs.

Tex., San Antonio—STORAGE—Peacock litary Academy, 1700 Cincinnati Ave., 30x x125 ft. struct. clay tile, steel, armory rage bldg., to S. Joe Dielmann, 107 Thelma $40,000. Leo M. J. Dielmann, 145 North engr.

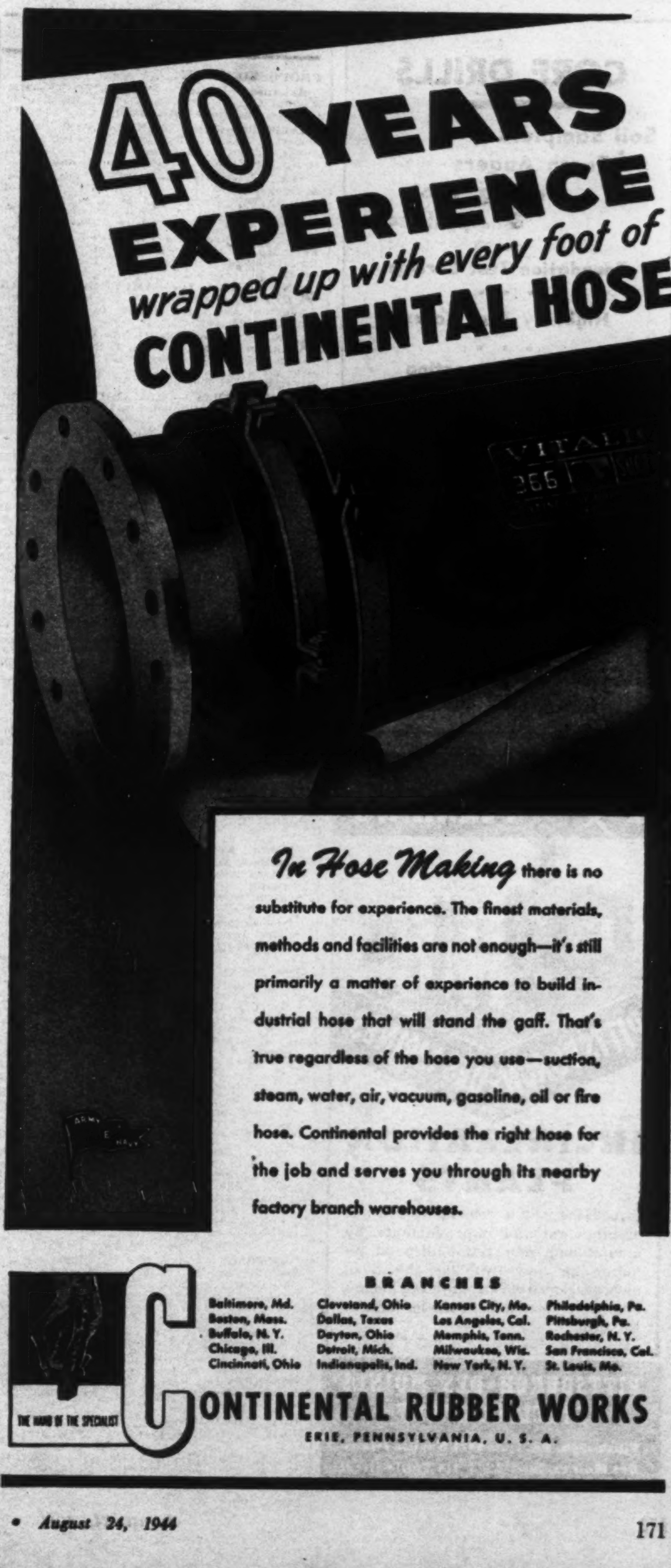
B. C., New Westminster—WAREHOUSE— cific Coast Terminals Co., Ltd., Columbia 1 story, 138x188 ft. frame transit ware- own forces, $45,000. Awarded 8/10.

Ont., Madoc—MILL—Canada Talc Co., Madoc, mill bldgs., head frame, shaft erations, to Dover Constr. Co., Ltd., 75 in St., Brampton. $50,000.

Ont., Toronto—GARAGE—T. T. Ferguson, 297 Victoria St., garage and office Parliament St. corner Fleet St. E., Victory Mills, Ltd., 25 Richmond St., to E. S. Martin, 16 Saulter St., $58,600. 8/7. CD 8/3—ENR 8/10.

Sherbrooke—PLANT—Hovey Pack- Co., Ltd., 30 Lansdowne St., altering t, to J. A. Verrey, Ltd., 66 Wellington N., $55,000. CD 7/27—ENR 8/10.

Ville La Salle (Postal Dist. Montreal) PLANT—Distillers Corp., Ltd., 1430 Peari Montreal, 77x160 ft. addn., to A. F. rs Constr. Co., Ltd., 1226 University St., ntreal. Est. $40,000.



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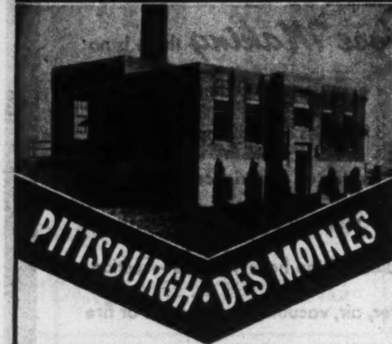

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UNCLASSIFIED

PROPOSED WORK

Arkansas—FARM CONNECTIONS—Mississippi Co. Electric Coop., Inc., Blytheville, farm connections, Mississippi Co. $240,000.

Louisiana—FARM CONNECTIONS, etc.—Jefferson Davis Electric Coop., Inc., Jennings, farm connections and substation equip., Jefferson Davis Co. $151,000.

†La., New Orleans—WHARF, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., bids soon. wharf and supply depot expansion and imprvs., NOY 10377. Over $100,000.

†N. J., Dover—RAILROAD—U. S. Eng., Penn Mutual Bldg., 6 and Walnut Sts., Phila., Pa., railroad work, roads at Picatinny Arsenal. $67,742.

★**N. J., Fort Lee**—AMUSEMENT PARK BLDGS.—Palisade Park (Amusement) Anderson Ave., new bldgs. for amusement park. $1,000,000.

★**†N. J., Hoboken**—PIERS—War Shipping Admin., 14 St. between E St. and Constitution Ave. N.W., Wash., 25, D. C., several ship piers in Hudson River, foot of 2nd and River Sts. $1,000,000.

North Carolina — RURAL LINES — Randolph Electric Membership Corp., Asheboro, exten. rural lines in Randolph, Alamance, Chatham, Moore and Montgomery Counties. $60,000. REA allot.

★**†Pa., Phoenixville** — AIRPORT — Civil Aeronautics Admin., 385 Madison Ave., New York, 17, New York, site surveys in progress, airport construction. $500,000.

Texas—FARM CONNECTIONS—Coleman Co. Electric Coop., Inc., Coleman, farm connections, Coleman Co. $100,000.

★**Tex., Galveston**—TUNNEL—Galveston County, c/o T. R. Robinson, judge, Galveston, making plans tunnel under Boliver Rd., Galveston Island. $8,700,000. Palmer & Baker, Inc., St. Michael and Royal Sts., Mobile, Ala., engrs. Test borings let to Raymond Concrete Pile Co., 140 Cedar St., New York, N. Y. CD 8/16/43—ENR 8/19/43.

Tex., Harlingen—OIL PIPELINE—Tom Gilcrease & Associates, Milam Bldg., San Antonio, oil pipeline work. Over $40,000.

★**Man., Winnipeg** — AIRPORT — Dominion Govt., Ottawa, Ont., revision Stevenson Airport, $500,000. Dpt. Transport, Ottawa, Ont., engrs.

Que., Riviere-au-Renard—WHARF—Dpt. P. Wks., Ottawa, Ont., plans made reconstructing wharf. $26,000.

BIDS ASKED.

Ont., Deseronto—AERODROME RUNWAY, etc.—Secretary Dpt. Transport, Ottawa, hard-surfaced runway, parking area exten. Mohawk Aerodrome. $65,000.

Bids Asked August 29

†Conn., New London—DEGAUSSING SLIP—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., degaussing slip addn., instrument house, platform on wooden piles and fender piles, Spec. 14727, NOY 10309. $10,000. CD 8/14.

New Jersey—TILE FACING—At office Executive Dir., Port of New York Authority. F. C. Ferguson, chn., 111 8 Ave., New York, N. Y., Contr. HT-2, replacing steel face plates with tile facing New Jersey Entrance Portal, Holland Tunnel. Plans deposit $5.

N. C., Carolina Beach—BOARDWALK REGRADED, etc.—A. E. Peay, mayor, Sect. 2, 67,868 sq. ft. board walk regraded and repaired; Sect. 1, 11.075 cu. yd. sand removal, 1,900 cu. yd. gravel on shoulders, 9,850 cu. yd. gravel on streets, 550 sq. yd. surface treated patching, etc.; Sect. 3 repairing motors, clearing sand from wet walls of 2 pump stations, 430 lin. ft. 6 and 8 in. vitr. clay pipe. $33,000. Plans deposit $15. Wm. F. Freeman, High Point, engrs.

Bids Asked August 31

N. Y., Brooklyn—WOOD FENDERS, etc.—At office of Executive Dir. Port of New York Authority, F. C. Ferguson, chn., 111 8 Ave., New York, constructing wood fenders and backing logs for Columbia St. Pier of Port Authority Grain Terminal, foot of Columbia St., Gowanus Bay, Contr. GT-3; plans deposit $10.

Bids Asked September 12

†Montana—TOWERS—At office Bureau Reclamation, S. O. Harper, ch. engr., Denver, Colo., furnishing del., f. o. b. cars at shipping point or f. o. b. cars Glendive, two river-crossing towers for Fort Peck-Glendive 115-kv. transmission line and substation structures for Glendive Substation, Fort Peck Project, Spec. 1760-D.

Calif., San Pedro—SHIPYARD BUILDINGS—Todd Shipyards Corp., San Pedro, (from selected list) 2 story, 50x185 ft. wood frame, central kitchen cafeteria bldg. $165,000.

LOW BIDDERS

†D. C., Bolling Field—AIRFIELD BLDG.—U. S. Eng., 1 and Douglas Sts., N.W., Wash., Zone 25, airfield service bldg., from W. M. Chappell, 316 Randolph Pl., N.E., Wash., $53,486. CD 8/11.

†Calif., Monterey—AIRPORT DRAINAG —U. S. Eng., 74 New Montgomery St., Francisco, Zone 19, addnl. drainage, Mon terey Airport, Job. No. 1435, from Grani Constr. Co., Box 900, Watsonville, $62, CD 8/11.

†Fla., Winter Haven—AIRPORT—Cit airport imprvs., from C & E Constr. Co. Lakeland, $41,778. CAA. Bids 8/9. E. H Diehl, 84 Marietta St. N.W., Atlanta, Ga. engr.

†Virginia—RAILROAD SIDINGS—U. S Eng., 21 St. and Virginia Ave., N.W., Wash. D. C., Aug. 16, railroad sidings, Cemer from A. S. Wikstrom, Bound Brook. $44,

★**†W. Va., Parkersburg**—AIRPORT IM-PROVEMENTS—Clerk Wood Co., Cour House, Aug. 11, Bid No. 1, excavation fro R. Meyers, P. O. Box 230, Salem, Ind., and Western Contg. Corp., 2100 E. 4 St., Sio City, Ia., $1,655,255***Bid 2, alternate A asphalt paving from Williams Constr. Co. Middle River, Md., $580,350***Bid No. 1 alternate B, concrete paving, from Allegheny Asphalt & Paving Co., 411 Blvd., of Allies, Pittsburgh, Pa., $647,914. CAA CD 8/4—ENR 8/3.

CONTRACTS AWARDED

†Alabama—RAMPS—U. S. Eng., Bynum concrete ramps for warehouses, Calhoun Co to Jones & Hardy Const. Co., Montevallo Est. $25,000. Bids 7/25.

★**†Ariz., Phoenix** — HANGAR — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., hangar, Litchfield Park, Spec. 14688, NOY 10264, to A. Farnell Blair, 9 Main St., San Francisco, Calif., $602,877. Bids asked Aug. 8. CD 7/25.

†Calif., Otay Mesa (San Diego P.O.)—AVIATION FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., addnl. aviation facilities, Auxiliary Air Station, NOY 9993, to Trepte Constr. Co., 631 9th Ave., San Diego, $339,427.

★**†Calif., Port Chicago**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., magazines, storage bldgs., etc., at Inland Storage area, Spec. 14729, NOY 10311 to Barrett & Hilp, 918 Harrison St., San Francisco, $5,296,848. Bids 8/2. CD 8/10.

†Colo., Pueblo—DOCK REPAIRS—U. S. Eng., Pueblo, repairing concrete warehouse docks, to A. C. Larsen, 944 Osage St., Denver, $28,000.

Conn., East Hartford—WIND TUNNEL ELECTRIC WORK—Pratt & Whitney Div. of United Aircraft Corp., 400 Main St., electric work in wind tunnel engine testing facility, to Baldwin-Stewart Electric Co., 222 Pearl St., Hartford, $55,800. Jackson & Moreland, 31 St. James Ave., Boston, Mass., engrs.

†Ga., Atlanta—HANGAR FIRE PROTECTION, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., fire protection for 3 hangars and storehouses and A & R exten., Naval Air Station, NOY 9657, to Automatic Sprinkler Corp. of America, 161 Spring St. N.W., $41,839.

†La., Harding Field (P. O. Baton Rouge)—TAXIWAY—U. S. Eng. 25 St. and Avenue F, Galveston, Tex., addnl. taxiway, to Barber Bros. Contg. Co., Reymond Bldg., Baton Rouge, $32,042. CD 8/15—ENR 8/17.

†Me., Lewiston—RUNWAYS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., imprv. runways and safety strips in Naval Auxiliary Air Field, NOY 9763, to Lane Constr. Co., 77 Colony St., Meriden, Conn., $237,150.

N. B., Petitcodiac River—HYDRO ELECTRIC POWER PROJECT—Provincial Govt., Fredericton, hydro electric power project to H. G. Acres, Niagara Falls, Ont., $40,000.

Pa., Harrisburg — SWIMMING POOL — Harrisburg Country Club, Fishing Creek Valley, 40x100 ft. swimming pool, to Lawrie & Green, 231 N. Front St., $30,000. Awarded 8/18.

†Fla., Banana River — AIR STATION BLDGS.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., exten. to administration bldg., general storehouse and bulk aircraft parts storehouse and paint and oil storehouse, Naval Air Station, NOY 10449, to Hillyer & Lovan, 408 Consolidated Bldg., Jacksonville, $185,214.

†Tex., Eagle Mountain Lake—FIRE PROTECTION—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., fire protection Naval Air Station, NOY 9467 to Automatic Sprinkler Corp. of America, 3932 McKinney Ave., Houston, $31,873.

†Va., Norfolk—SALVAGE YARD, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., salvage yard, incl. services and railroad spur, Naval Air Station, NOY 9372, to Abbott & Ritchie, P. O. Box 291, Newport News, $136,235.

†Virginia—STEAM HEATING SYSTEM—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., steam heating sys. addns., alterations, A A T and T C, Dam Neck, NOY 10135, to Daniel & Abbot Co., Hopewell, $121,122.

Proposal Advertisements see p. 173 & 1
Postwar Projects see p. 124

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